



# THE INDIAN JOURNAL OF SURGERY

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## QUARTERLY

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## NOTICE TO CONTRIBUTORS

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# THE INDIAN JOURNAL OF SURGERY

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सोऽपतानकसंज्ञो यः पातयत्यन्तराऽन्तरा  
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कफपित्तान्वितो वायुर्वायुरेव च केवलः ॥  
कुर्यादाक्षेपकं त्वन्यं चतुर्थमभिधातजम् ॥ ५८ ॥  
गर्भपात निमित्तश्च शोणितानिस्त्रवाच्च यः ॥  
अभिधात निमित्तश्च न सिध्यत्यपतानकः ॥ ५९ ॥

*Tetanus results from the frequent entrance of the humour "Wind" accompanied by the humour "Phlegm" into the bloodvessels, causing the person to fall down at intervals. In the variety called "Dandapatanaka" (Orthotonus) the person becomes stiff like a rod. This is very painful. There is also trismus as a result of which he can take food only with difficulty. In the variety called "Dhanushtambha" the person gets bent like a bow. When the darting wind strikes forcibly against the network of muscles and tendons etc, in the toes, ankles, abdomen, heart, chest and neck, the eyes become motionless, there is lock jaw and pain in the sides. When the person gets bent in the middle (Front?), the variety is called "Abyantaramamum" (Emprosthotonus). When the muscular net work outside*

(Posterior <sup>2</sup>) is affected, the variety is called "*Bahyayamum*" (Opisthotonus) The wise (Physicians) consider those cases hopeless in whom the chest, back or abdomen is bent Tetanus is of four kinds and results from (1) Wind and Phlegm, (2) Wind and bile, (3) Wind alone or (4) from a severe injury Tetanus coming on after abortion after severe loss of blood and as a result of injury is incurable

—SUSHRUTA SAMHITA, NIDĀNASTHĀNA,

(Diagnosis and Prognosis)

Chapter, one, 52 to 59 Verse

## THYROID SURGERY IN INDIA

*On 23-10-'41, at Calcutta, before the Annual Conference of the Association of Surgeons of India while opening a Discussion on "Thyroid Surgery in India," Lt-Col K G Pandalar, I M S (Retd), spoke as follows —*

I have ventured to select Thyroid Surgery for to-day's discussion with a view to draw attention to a branch of work which is comparatively rare both in private practice and in our large Hospital Surgical wards. The condition seems prevalent in all parts of our country and among all races, but its actual frequency of occurrence, like most other diseases in India at present, seems difficult to estimate. Cases are seen by Practitioners of all kinds, by Physicians and Surgeons, and with a view to discover the amount of Surgery practised for its relief, I addressed a brief Questionnaire to a small number of Surgeons known to me practising in different parts of India and who I thought are likely to see such cases. This effort has been only partially successful as I have received replies only from half the number, but from the replies of those who have kindly written, certain interesting observations have been brought to light and are being presented to-day.

One of my objects in sending out the Questionnaire was to determine if we have in India, special Goitrous areas or districts where the condition is prevalent to a greater extent than elsewhere. The replies I have received do not point to such districts, but I may not be fully informed about other areas about which I have received no replies but hope we shall be enlightened, in the course of the discussion to follow, on this and allied points by those practising in various parts of the country. Unfortunately, the number of cases seeking Surgical help in an individual-Surgeon's practice is small in India in comparison with the large numbers seen in foreign countries. I may illustrate this by the figures I have been able to collect from friends and the following table gives a summary —

Hospitals	Surgeon	Toxic	Non-Toxic	Malig	Period
Mission Hospital, Neyyoor, S Travancore	Somerville	52	57	17	5 Yrs
Government General Hospital, Lahore	"	10	50	5	5 Yrs
General Hospital, Trivandrum. (Approximate)	K P Raman Pillai	25	25	—	20 Yrs
Mysore General Hospital	J F Robinson 13 } and Misra 7 }	8	12	—	5 Yrs
Madras General Hospital including Private cases	K G Pandalar	23	32	3	15 Yrs 6 Yrs
Oosmania Hospital, Hyderabad	Khurshid Hussain and Bahadur Khan	10	7	1	10 Yrs

Regarding the causes of the comparative infrequency of the condition, all that we could do is to speculate, it may be that the disease is actually rare or perhaps fear of surgery keeps people away from us or there is no knowledge that surgery or other treatment is safe and beneficial. This last is probably the largest factor. Perhaps the advent of X-Rays and Radium as an alternative method in the more important Centres where they are available may have something to do with it. However, the above figures show that our generation of Surgeons has done more in this line than our predecessors and it is likely that with continued enthusiasm and co-operation between Physicians and Surgeons, we shall be doing in the near future much more goitre surgery than at present.

Although the title of the subject of today's talk might appear comprehensive, actually I shall confine attention to the main conditions for which Surgery is generally practised. The subject is so vast that I may be forgiven if I suggest that we restrict the scope of our discussion to the *practical* aspects of the subject and omit all controversial points, such as Aetiology of goitres and the inter-relation of the Thyroid to other Endocrine glands in the body. To-day, there is no need to touch upon the well-known details of the anatomy and origin nor the main features of the physiology of the gland. Regarding the latter, there are admittedly gaps in our knowledge, and we shall, therefore, discuss the simple and malignant goitres as well as the group of cases labelled Toxic Goitres.

Regarding the simple goitres, variously classified as Parenchymatous, colloid and Nodular goitres, the nodular is by far the most common lesion in the Thyroid. It is also known that a majority of Parenchymatous Goitres occur in children, the Colloid is the common goitre of the adolescent and Nodular growths are the feature of adult life. This is a broad classification, but examples of all types are met with at all ages and often in the same goitre. The nodules may occur singly or in large numbers, only one lobe may be involved or on the other hand all the lobes including the isthmus may be the seat of multiple nodules of adenoma. Since, in itself, it is painless and does not cause distress, unless it causes compression of the trachea or esophagus or a complication, e.g., haemorrhage or infection, sets in or it gets impacted in the upper aperture of the thorax, cases are generally ignored in the early stages and are seen in advanced stages. Disfigurement is commonly present but dyspnoea and dysphagia are rare. The greatest danger lies in the onset of Toxicity or malignancy both of which are serious calamities. It follows, therefore, that the rational course to follow is to remove the adenoma or portions of the gland containing the growths if multiple, whichever is feasible, as early as a diagnosis is made. In every case a microscopic section of the tissue removed should be examined to prevent missing of malignant growths.

Few Physicians would nowadays advise a patient with a simple goitre to be content with medicinal treatment alone, e g, Iodine or Thyroid extract or Intestinal antiseptics, nor would they willingly permit a case to be treated exclusively by X-Rays or Radium, for although some benefit often accrues by way of reduction in the size of the swellings and alleviation of secondary toxic symptoms if any, a permanent cure is rare and one always runs the risk of playing with what might be an early carcinoma. It has been estimated from the figures of clinics handling large numbers of goitre cases that 90% of malignant goitres spring from pre-existing adenomata and that of all adenomas anything up to 8% may become malignant. This calamity could be prevented by a timely removal of nodules in the thyroid if seen early.

If malignancy is strongly suspected or actually present a complete removal of the gland with its main veins, muscles and nerves should be done.

Regarding the use of X-Rays or Radium, a Surgeon naturally would not advise its exclusive use unless Surgery is in-admissible, but patients do not always follow our advice and Radiologists are often called upon to treat them in the first instance. The results of such treatment would depend upon the diagnosis. In cases of uncomplicated adenomatous Goitre, Radiation generally does not produce appreciable benefit, but if Toxic symptoms are present, relief in some degree may result. Also in adequate dosage, malignant cases are frequently benefited by radiation. But such relief except in the hands of expert Radiologists is uncertain. The ideal in the present state of our country in this as well as in all serious pathological conditions of the Thyroid Gland remains unaltered, viz, in every case to remove the pathological tissue, and apply radiation afterwards to complete the cure.

The commonest Malignant growth in the thyroid is a Primary Carcinoma (90%), but Sarcomata and Mixed cell tumours are also seen (10%). Among cancers, adenocarcinoma is the commonest variety and accounts for 75%. Papillary Carcinomas account for 20% and the remainder are made up of the Scurrhous variety. It may not be large at the outset, herein lies its danger, as it may be mistaken for a simple goitre. It may also be remembered that Toxic symptoms are often produced by malignant growths as by benign growths.

In cases of malignant goitre, as stated above, large statistics have shown that at least 90% of cases have followed simple adenomas. The necessity, therefore, is obvious of removing even apparently inoffensive lumps just as urgently as in the adult female breast. This is one of the appeals that a Surgeon would make to General Practitioners who see such cases in the first instance, viz, that an unhesitating advice should be given for the Surgical removal of all such lumps. Again, it is usual for all of us in India to see malignant disease of the Thyroid Gland in an advanced in-

operable stage, and although this is intelligible in the case of cancer of internal organs where on account of pain and other symptoms being not prominent in the early stages, diagnosis is uncertain, yet in the case of the Thyroid, such cases disclose a deplorable state of affairs. The front of the neck is such an obvious part of the body that any enlargement of the Thyroid, is readily seen. The patient or people round him will soon notice it and it should be impressed on all practitioners to take serious note of all such swellings remembering that it is only in early surgery that salvation lies. A surgeon should be called in and every effort should be made to induce the patient to undergo surgical treatment. As modern Hospitals are springing up everywhere in the country and duly qualified Surgeons are increasing, there is no longer need to feel despondent when face to face with Malignant disease of the Thyroid. But early diagnosis is the key to success. Fortunately, cancers of the Thyroid are so radio-sensitive that even in the presence of the largest growth one need not give in to despondency as even with a limited or partial removal, followed by X-Ray or Radium treatment, relief with freedom from distressing symptoms lasting for many years is often obtained. The tendency of these tumours to form distant Metastasis may also be remembered.

The main part of the work of the Thyroid Surgeon is in connection with Toxic Goitres. This is marked in advanced cases by various degrees of exophthalmos, flushing and sweating of face, muscular wasting, tachycardia, diarrhoea, nervousness, exhaustion and occasionally mental changes and glycosuria. Such symptoms may or may not co-exist with an enlargement of the Thyroid. When symptoms supervene on benign Thyroid enlargement, it is called secondary Thyrotoxicosis, but when there is no pre-existing enlargement, it is known as primary Toxicosis or Grave's disease. This is a condition with which we are all familiar and in various degrees of severity is known to occur in all parts of India. The cause is associated with derangement of Iodine metabolism, and increase in the B.M.R., but simple substitution of Iodine by medicine does not produce anything but a temporary improvement. The underlying pathology is more widespread and although our knowledge of the disease is far from complete, we are able, especially in the early cases, to do much good by surgical treatment. This consists in removal of quantities of the gland sufficient to cut off a large part of the supply of the offending hormone which is believed to be the main cause of the symptoms above mentioned. The name Hyperthyroidism implies our understanding of the pathology as an excessive production of the Thyroid secretion. Although some have stated that there is also an element of perversion of the secretion in addition to a hypersecretion, this is a matter of speculation. Also all are not agreed that the Thyroid is primarily at fault, but that other members of the chain of endocrine glands, viz., the pituitary, adrenals and genital glands are also culpable. But, generally speaking, removal of portions of the thyroid with this object is a techni-

cal problem within the competence of most Surgeons, who have the equipment for the purpose, but not every patient is fit for such a step when first seen. Some are so weak that they have to be medically treated and got into a fit state for the operation. In this process, rest in bed, nourishing diet, avoidance of worry, bromides and digitalis as required to ensure these ends, as well as a supply of Iodine are the principal factors. Lugol's Iodine, 20 drops (thrice daily) in water is generally administered. In the old days, this used to be persisted in for weeks and months generally with poor results. Plummer has shown that Iodine in these cases produces temporary benefit only and the maximum is reached in a fortnight after which its continued use is useless. Many patients can be brought into a fit state for operation by this method. There are others who are so ill that they will not stand operation of any kind with or without the administration of Iodine. For them it is permissible to use Radiation to control symptoms. Relief is thus obtainable but unless the treatment is given by expert men for prolonged periods a false sense of security may be engendered and it is necessary, therefore, to utter a word of warning against the indiscriminate use of Radiation for all conditions of the thyroid and to adopt the competitive attitude of Radiation *vs* Surgery in the management of these cases. The Radiologist and the Surgeon have to be in frequent consultation and it is a mistake to let the patients alone as their general tendency is to avoid the Surgeon unless driven to do so by sheer necessity. The point to remember is that as far as Thyroid secretory activity, whether physiological or perverted, is concerned nothing short of removal achieves the purpose aimed at quickly and effectively. Other measures, by administration of Iodine and Radiation are available to tide the patient over a crisis, but in the present state of our country the operation of partial Thyroidectomy should be our standby in all cases.

Sometimes in spite of the palliative measures above mentioned patients will not improve well enough to stand the operation of partial thyroidectomy. In such cases it is still possible sometimes to get a temporary palliative effect by ligation of one or more of the thyroid arteries under a local Anaesthetic. There is no doubt about the partial relief thus obtained. It also saves time when later one comes to perform the operation of partial thyroidectomy. A number of other measures formerly in vogue, *viz*, removal of the Thymus, or the cervical sympathetic chain are not in use to-day and hardly need mention. Coming to statistics, it is admitted that my figures are not large, but as they are, they corroborate the general conclusions of surgeons elsewhere who have handled larger numbers of cases.

Finally, it may be mentioned that in thyrotoxicosis we are dealing with a constitutional disease of which the thyroid is only one of the causative factors. We find that if we get cases of Thyrotoxicosis in an early stage, they do well and are restored to many years of normal health by early

partial thyroidectomy, but that if seen later, when the heart and nervous systems have been damaged, relief by operation is only partial and temporary and recurrences occur. When they do recur, it is possible that re-operation and removal of further quantities of the Thyroid gland will cause improvement, but generally they improve but slightly and we have to consider other measures of relief. Among such are Deep X-Ray treatment of the neck, more particularly in the elderly post-menopausal cases, Radiation of the pituitary has been known to produce dramatic successes in obstinate cases where treatment of the Thyroid has been unsuccessful. The number of cases so benefited is steadily increasing and although the rationale is obscure, there seems no doubt of the benefit thus obtained. A few do not improve and lapse into a state of chronic illness requiring medical treatment by tonics, bromides, digitalis, etc., for the rest of their lives. These patients are, in fact, abnormal and unfit for the stresses of life and have to be treated as chronic invalids.

It has been suggested that in such patients, a possible method of relief is by Denervation of the Adrenals. Unfortunately, this is a serious operation especially in these subnormal patients, and the method although tried by a few Surgeons is not likely to find general favour.

When one sees a number of these unfortunate failures of Thyroidectomy in late cases of Toxic Goitres, failures which in India are likely to be imputed to the operation or operator, it is driven home to us to try and tackle them earlier before they get into the 'problem' state, when we have to rely exclusively on medical treatment by X-Rays, bromides, etc.

Before closing, I may be permitted briefly to refer to the occasional Thyroid emergencies which it may be the lot of any practitioner to handle—These are of several types

1. Acute Thyroid Crisis—Idiopathic or following trauma, mental or physical— It may follow operations for Goitre from accumulation of secretion in the wound due to defective drainage.

2. Some crises are due to a sudden increase of compression in a pre-existing goitre by haemorrhage into a cyst. The dyspnoea ensuing may be serious enough to demand urgent surgery and if temporary expedients such as the aspiration of tense swellings do not afford relief, emergent surgical removal of the offending tumour may have to be undertaken.

3. Acute compression may supervene on a chronic simple goitre necessitating an operation often in unfavourable surroundings and at midnight, a patient may be brought in a moribund cyanosed state, but it is remarkable in these cases how much resection of the offending glandular tissue can be done with very little or no anaesthesia,

4 Occasionally in long-standing goitres in elderly people an emergent operation for dyspnoea may be required. These tumours may be of a malignant and unyielding nature and in such the depth of the trachea due to the mass of the overlying tissue, as well as the length of the compressed segment make the operation difficult and necessitate a long semi-rigid tracheotomy tube, which occasionally may not be available and once again show the importance of early Surgery of all long-standing goitres in elderly people.

Finally in 1913, McCarrison estimated that there were at least 5 Million goitre cases of all types in India, including at least  $\frac{1}{2}$  Million Cretins. If that was so nearly 3 decades ago, we have no reason to think that their number could be much less to-day, they may be more, and I make bold to predict that following the discussion to-day before this august body, we shall have in the immediate future a marked increase in the amount of Thyroid Surgery practised in this country. To this end, the following are necessary —

- 1 Closer contact between Physician, Surgeon and Radiologist.
- 2 A general improvement of our methods of Anaesthesia
- 3 Reduction of operative mortality
- 4 Reporting of our cases in the Indian Journal of Surgery

### DISCUSSION

Col Anderson (Calcutta) agreed with Col Pandalai that toxic goitre was not uncommon in India, but cases coming to the Surgeon were very few, probably because the Physicians consider that very few Surgeons can cure the disease. Cases were sometimes referred abroad and he knew of one case which died on the boat and another which was operated on abroad for an adenoma, but developed carcinoma 18 months after return. Lack of knowledge that a thyroid tumour may not always be present has led to some of the patients being referred from Cardiologist to Cardiologist and others being treated with insulin for months with B.M.R.'s of  $+50$  and over. Patients are not told of the results of Surgical treatment and are treated medically with Lugol's iodine and come to the Surgeon in late stages when Surgery is very difficult. Treatment with X-Rays is also advised without sufficient knowledge of its reaction. If sufficient dosage is not given, the thyroid is stimulated, the resulting fibrosis also makes Surgery difficult later on.

Dr G D Kapur (Lahore) gave figures from the Lahore General Hospital for the last five years. There were 50 non-toxic goitres, 10 toxic, all from non-endemic areas and 10 malignant goitres, all diagnosed adenoma clinically, but proved malignant on histological examination. He said that goitre was greatly prevalent in the area below the Himalayas—the Khangra, Kashmir and Kulu Valleys. He thought the low figures in hospitals were due to the absence of well-trained Surgeons. He used local anaesthesia for operations in both sexes and left only a small strip of gland to save the recurrent laryngeal nerves and the Parathyroids. He has given up drainage in his later cases with good results. He has not so far had a case of Thyrotoxicosis.

Dr Khurshed Hussain (Hyderabad) had records of ten cases all in females. He has observed several cases in one family. He gave an instance of sudden death after operation for parenchymatous goitre which he attributed to heart failure from change of posture. He had two toxic cases in one of which he only ligatured the Inferior Thyroid Artery. He used Chloroform in all the 10 cases and gave calcium and iodine for 15 days before and after operation.

Dr Hyder Ali Khan (Hyderabad) said endemic areas were near Dehra Dun and Khangra Valley places where the water is hard and the soil chalky. Females were more commonly affected, the age incidence being 35-40 years. Cases were referred late to the Surgeon. He considered local anaesthesia safe and Crile's method of Stealing the Thyroid quite good. Rectal Olive Oil and Ether has also been found to be useful.

Dr R N Cooper (Bombay) said that the B.M.R. is lower in India and he has not seen very high values. He had records of 16 cases and he has seen more cases in the last 3 or 4 years than before. Most cases were from Ratnagiri, Goa and Jaipur. Cases from the two former places were usually adenomas while those from the latter were usually parenchymatous and mostly among Marwaris. He had two cases of toxic Goitre—one without external swelling of the gland. There was also one case of Hashimoto's disease and one of Reidl's Struma. He has been treating one case of parenchymatous goitre in an elderly man with injections of Thyroxin with good results. He advocated selection of cases leaving out patients above 50. He discussed the choice of anaesthetics and his technique. He has found the Lahey double hook a very useful instrument. He considered a drain necessary and used clips for the skin. He reported one case in which the superior Thyroid arteries were ligatured in two stages and the patient developed intensive Thyrotoxicosis and died.

Dr Joglkar (Bombay) had recorded 14 cases of which 7 were adenomata, 5 toxic goitre and 2 malignant goitre. His impression was that goitre was not so common in Bombay. 4 or 5 of the adenomas were from Ratnagiri and of the toxic goitres 3 were from Hyderabad and 2 from Bombay. In the case of the adenomas, he had no complications and had operated on them under local anaesthesia. Their B.M.R. had varied from  $+21$  to  $+1$ . One of the worst cases that he had was a toxic goitre with a duration of 4 months during which time the patient had lost 40 lbs and on examination, his B.M.R. was  $+75$ , Pulse Rate 170 P.M. and he had 6% sugar in his urine with acetone and albumen and he also had a severe degree of auricular fibrillation and tremors.

In his practice he had always worked in conjunction with a physician and never alone. The last five cases that he had done were all successful and had given no trouble during the post-operative period. He agreed with Col Anderson that Lugol's Iodine should in no circumstance be used except 8-10 days before operation. He gave in the pre-operative period Quinine Hydrobromide and Physostigmine Salicylate with a good nutritious diet. If the B.M.R. was over 35, he did the operation in two stages, the second stage following the first after a month. As to the question of how much of the gland was to be removed, he had always removed both the lobes with the Isthmus and part of the lower pole. As to anaesthesia he always used local, supplemented if necessary, with gas and oxygen with sometimes rectal paraldehyde for pre-operative medication. Nembutal and hemital were also used and cyclopropane also worked quite well.

Dr Patel said that he had done 24 cases during the last 10 years of which 18 were cases of simple goitre, 5 of toxic goitre and one of malignant goitre. Of the simple goitres, one was retrosternal. He had always taken great care to diminish the shock of the operation as much as possible. He usually gave morphia in the morning and used open

ether during the operation. For the toxic goitres he had found local anaesthesia quite satisfactory. He had always tried to avoid operation in the winter.

Dr Iyengar (Mysore) had records of 17 cases—of which 3 were toxic and had operated on one, 10 were simple goitres and 4 were malignant all of which came at the late stages and one of them was so big that it had spread down into the chest and of course nothing could be done for it. For the Simple Goitre cases he gives Morphua and removes them under local anaesthesia.

Dr Baliga (Bombay) had recorded 85 cases during 5 years in the King Edward Memorial Hospital, of which 51 were in females and 34 in males. His figures as to the age incidence were—22 cases in the 2nd decade, 32 in the 3rd decade, 16 in the 4th decade, 11 in the 5th decade and 4 cases above 51, thus showing that it is commonest in the 3rd decade. The youngest case on record was 12 years, the oldest being 69 years.

Out of the 21 simple cases, 15 were operated upon with one fatality and that was a female aged 23 years who died of acute thyroid crisis within 2 hours of the operation with a pulse rate of 160 P.M. and hyper-pyrexia. Of the 44 toxic cases he had operated on 19 with 4 fatalities. Of these 44 cases, 25 had pressure symptoms—with dysphagia in 19 of them, respiratory distress, dysphagia and stridor in 6, hoarseness and recurrent laryngeal nerve involvement in 3. Of these he had operated on 12 with one fatality. Of the 5 cases of malignant goitre he had, 3 had produced pressure symptoms, and he had operated on 4 and one died. Out of his 85 cases, 1 was a case of Hashimoto's disease and one of Myxoedematous goitre. He had found that the B.M.R. was not very high in Indians since with marked Thyrotoxicosis 40% had an almost normal B.M.R. and so he did not attach much importance to the B.M.R. Five of his toxic goitre cases had glycosuria. Dr Baliga further said that he always insisted on local anaesthesia for all his cases and that he actually used to make his patients lie on the operation table with neck extended for seven days before operation since he found that they used to complain of the peculiar position of the neck during operation. He had sometimes used avertin or paraldehyde and morphua or scopolamine and found them quite satisfactory. General anaesthesia was given only in 3 cases out of a series of 14 cases, the anaesthesia of choice being local.

Dr Mehta wanted to know the effect of toxic goitre on pregnancy, labour and the child and whether pregnancy has to be terminated in cases of acute thyrotoxicosis. He also desired to know whether thyroidectomy had been tried as a treatment for congestive heart failure. In the two cases that he had done the results were good but temporary. In one case of his with a B.M.R. of  $+10\%$  he had tried Radiation without any result. He had seen one of Dr Joglekar's cases where in the thyroid swelling another swelling with expansive pulsation appeared concomitantly which was an aneurysm of the superior thyroid artery and he wanted to know the relationship between them. Discussing the choice of anaesthesia, Dr Mehta said that he had always used local supplemented if necessary with rectal paraldehyde morphua or gas and oxygen. As to the question of drainage, he considered drainage necessary for 20 hours after the operation.

Dr Srivastava considered Gaya as an endemic area where nodular adenoma was commoner and he had not seen any case of primary toxic goitre there excepting for one case of toxic goitre super-imposed on an acute thyroiditis where there was evidence of pus, the patient doing well after evacuation of the pus. He had seen two cases of carcinoma, one with a secondary nodule in the skull and the other diagnosed after pathological examination and he had advised deep X-Ray therapy in both cases. He stressed on two points as regards the etiology of goitres—one being the presence of excess of

calcium in water and the other was infection as the cause of enlargement of the thyroid. He had records of 24 cases of operated adenoma and one case of toxic adenoma where there was pressure on the Recurrent Laryngeal nerve with dyspnoea and hoarseness of voice. He wanted to know about the value of post-operative administration of thyroid extract and said that he had seen a case in London where the patient had to be kept on Thyroxine after operation. For treatment of parenchymatous goitre he used colloid Iodine and he had proved that deep X-Ray therapy often gave good results and caused a definite reduction in size.

Dr C P V Menon (Madras) had records of seven cases of toxic goitre primary and secondary operated on during the last two years. He said that, of late, physicians are realising more and more the benefits of surgical treatment and are referring cases earlier to the Surgeon. One case of secondary toxic goitre that he had was in an elderly man of 45 years with advanced auricular fibrillation and though he was reluctant to operate on him, the Physician insisted that the only chance lay in operation. He was operated on and died of cardiac failure on the night of the operation. This was the only mortality in the series. As to the B.M.R. in these cases, he had noted quite high values, in one case the B.M.R. being as high as + 204, coming down to 100 after medication and 10 after operation. This was in a case which had no previous medical treatment. In other cases the B.M.R. usually gave values well over 50% and they all came down to normal or below normal after operations. He had used mostly rectal avertin and gas and oxygen for anaesthesia. As regards the operative technique, he usually did not find it necessary to divide the pretracheal muscles, but would have no hesitation in doing so if considered necessary, he has made it a routine to ligature the Inferior Thyroid Artery on each side early in the operation before dealing with the thyroid. Continuing Dr Menon said that he did not consider stealing the thyroid necessary in every case. In one particular case where he had to postpone operation twice for various reasons, he had noticed that the patient's pulse rate used to go up each time the operation was postponed. This was in a patient who had a brother operated on by Sir Thomas Dunhill for the same complaint and had been cured.

Dr A K Mukerji wanted to know from the opener the explanation of the following —

The persistent increase in toxicity that he had noticed in a case of toxic adenoma in a lady of the 3rd decade three months after operation. The lady had before operation signs of toxicity with no Exophthalmos and at operation he had been able to remove the adenoma easily with the capsule. The second case was of a simple adenoma in a lady of the 3rd decade and on the sixth day after operation she had developed recurrent laryngeal nerve paralysis which was complete on the 8th day and on the 20th day she had severe dyspnoea and stridor. His third case was a simple adenoma with no toxic symptoms, but microscopical examination showed that it was hardly distinguishable from a toxic gland.

Dr Moolgavkar said that preliminary to operation, the administration of Quinine hydrobromide in 2-3 gr doses effectively brought down the pulse rate in toxic cases. For pre-operative medication Sodium amytal worked satisfactorily, but he preferred to use rectal paraldehyde and morphia. He used intratracheal ether and chloroform rather than local anaesthesia since with the former, the gland could be handled easily. For operation he adopted Joll's technique and rarely did he find it necessary to divide the pretracheal muscles.

Lt-Col Pandalar in summing up thanked the Surgeons from different parts of the country who had contributed to the discussion and thrown light

on various aspects of the subject. He felt sure that this discussion would greatly help to disseminate among the General Practitioners of India, the knowledge of the great relief that Surgery gives to patients suffering from Thyrotoxicosis.

Regarding the points raised in the course of the discussion he did not consider it necessary to refer to all of them, but wished to say in reference to the relation of Thyrotoxicosis to pregnancy, that the general principles of treatment remain what is recognised in the case of all other diseases complicating pregnancy, *viz*, the well-being of the mother should be the main consideration. If in spite of treating the Goitre, life is threatened by the pregnancy, there should be no hesitation in terminating pregnancy.

Regarding Thyroidectomy as a treatment for congestive Heart disease, the common experience is that the results are poor and no reliance can be placed on it as a means of affording relief.

As regards the persistence of toxicity after operation noted in his case of Thyroid Adenoma by Dr A K Mukerji, the explanation must be in undetected masses of adenoma not removed at operation, but have taken on toxicity later. The case should, therefore, be operated on again and further quantities of gland tissue removed by a subtotal thyroidectomy.

His case of apparent damage to recurrent Laryngeal Nerve in which symptoms developed on the 6th day after operation and advanced to Stridor on the 20th day is most interesting. The explanation probably lies in a gradually developing pressure from incarceration of the nerve in adjoining scar tissue and the remedy would appear to be re-operation and release of the Nerve on the affected side.

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# NEURO-ARTHROPATHY

*(With a report of a case caused by Lumbar Rachischisis)*

BY

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AND

DR N S NARASIMHAM, F R C S

Neuroarthropathies originally described by Charcot and usually designated after him as Charcot's joints may arise from a variety of causes, which produce analgesia in the joint and impair the co-ordination and tone of the connected muscles. The most common among them (80%) is tabes dorsalis. Nearly 3% of tabetics are said to develop Charcot's joint. Among other causes, cerebral haemorrhage, general paralysis, cerebral diplegia, cord lesions, syringomyelia, myelitis, Pott's disease, tumours of the spinal cord, paraplegia, leprosy, acute anterior poliomyelitis and even peripheral neuritis have been mentioned, i.e., either an upper motor or lower motor neurone lesion or mixed lesions.

The following case of neuroarthropathy of the ankle and foot associated with an occult form of lumbar bifid spine is reported on account of (a) its many interesting and unusual features, (b) its almost complete clinical latency and (c) the etiological role of sensory disturbances.

## CASE REPORT

A Hindu male, aged 24 years, admitted under the care of one of the authors (Narasimham) on 26-12-36 for a painless ulcer on the sole of the left foot of five years' duration, had a swelling in the middle line of the lumbosacral region from birth. A sharp thrill resembling that felt on receiving an electric shock was complained of over the swelling, as the result of trauma. Micturition and defaecation had been precipitate. Incontinence of the former had set in five years prior to admission, about the same time, a painless, indolent gradually extending ulcer also appeared in the centre of the sole of the left foot. Clinical examination revealed poor nourishment, slight left sided scoliosis, lumbosacral bifid spine (L4 & 5 and S1) (Fig 1) with a soft lipomatous sessile swelling (4" x 4") lying over it (Fig 2) and a perforating ulcer on the sole of the foot of about the size of a rupee. The skin over the lumbo-sacral swelling and left buttock was coarse, thick, deeply pigmented, ulcerated, (over the buttock) and covered with dry scales. It was freely movable over the swelling, though slightly dimpled longitudinally, and palpable over a bony projection of the spine a little to the left of its centre. The continuity of the spinous processes was lost to the palpating finger at the upper part of the swelling where the finger dipped in to some extent. Over the rest of the swelling,

a firm fixed bony plate was felt on deep palpation, corresponding to the spinous processes of 4th and 5th lumbar and first sacral vertebrae. There were disturbances of sensation over the gluteal and circumanal regions and the lower extremities, the nature



Fig 1 Slight left sided scoliosis



Fig 2 Lipomatous swelling over the upper part of lumbar spine of L I and L II

and extent of which are shown in Fig 3. Subjective sensations of tingling and numbness were occasionally complained of in the feet which were otherwise completely anaesthetic. Superficial and deep reflexes were normal except that the plantar reflex could not be elicited. The sphincteric control of the urinary bladder was lost, the vesical evacuation being automatic. The rectal sphincter was lax. Locomotion and co-ordination were good. The right peroneal and calf muscles appeared to be slightly wasted. Skeletal musculature generally showed no loss of tone or power. There were no fibrillations or twitchings. Radiological examination disclosed, besides the scoliosis, slight tilting of the pelvis to the right, impaired growth of the left femur, absence of the laminae and spinous processes of L4, 5 and S1 vertebrae and their replacement by a triangular bony plate situated about 1 to  $\frac{1}{2}$  inches away from the vertebral column in the upper part and only one inch away in the lower part (Fig 4). In the left foot and ankle, disorganisation of the ankle joint, compression of the Os-calcis, and destruction

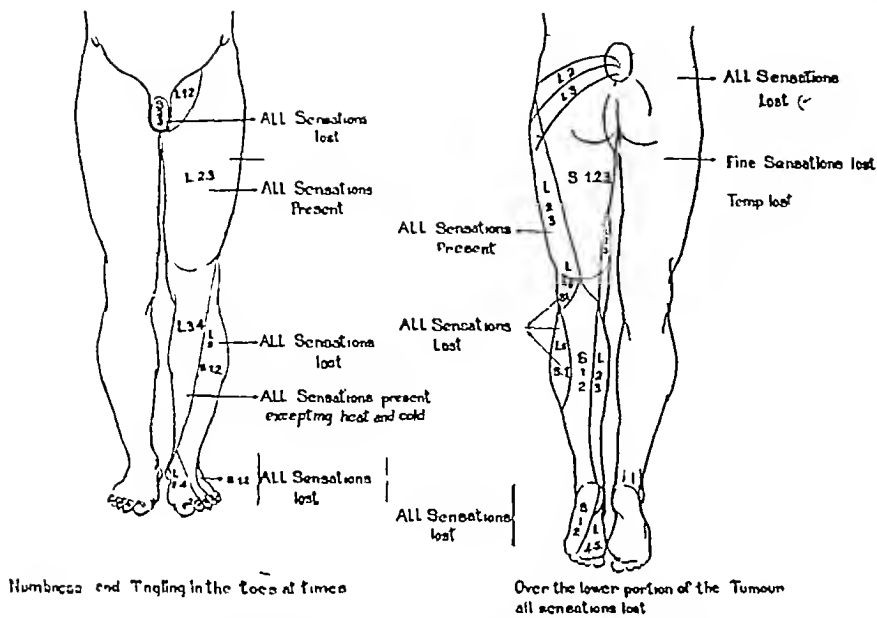


Fig 3 Chart of sensory disturbances in the lower limbs



Fig 4 Skiagram showing absence of the laminae and spinous processes of L 4, 5 and S1 vertebrae and their replacement by a triangular bony plate

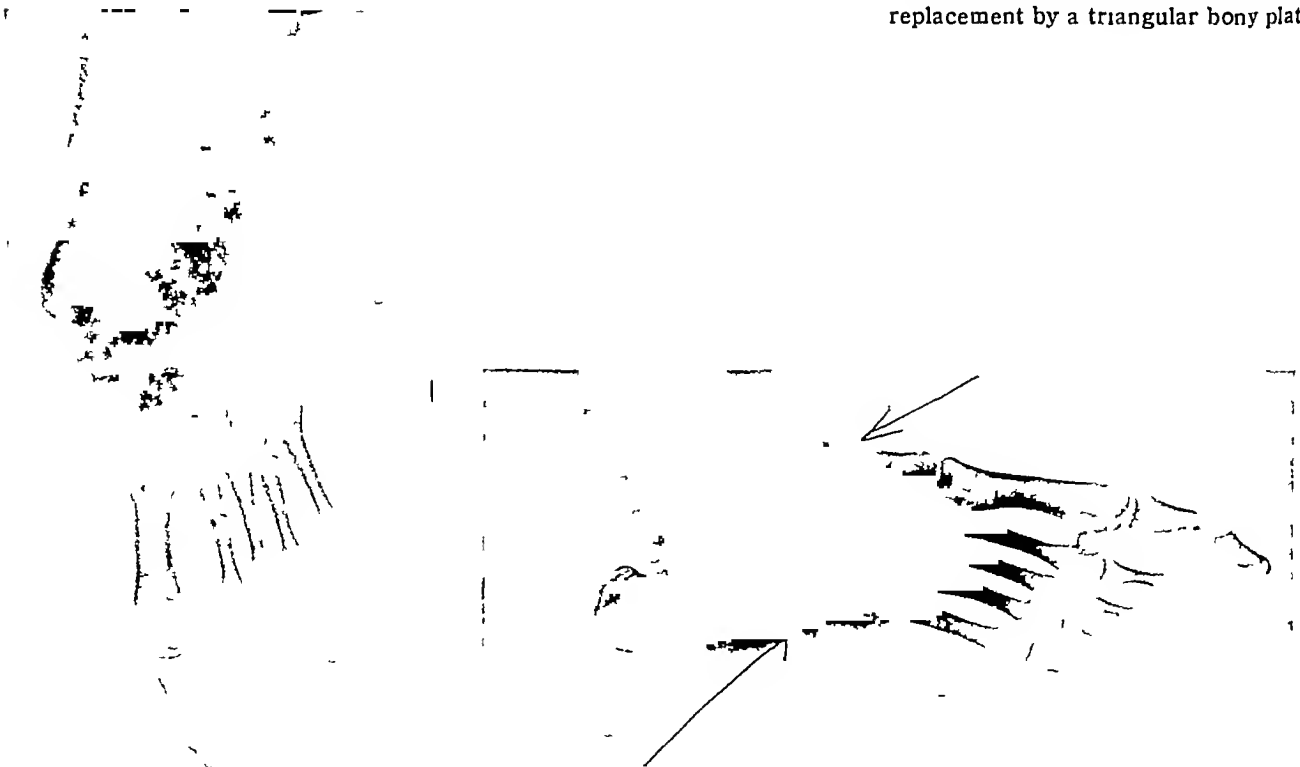


Fig 5 Skiagram showing disorganisation of the left ankle joint, compression of os-calcis, and destruction of the astragalonavicular, talo-calcaneal and calcaneo-cuboid joints

of the astragalo-navicular, talo-calcaneal and calcaneo-cuboid joints were observed (Fig 5) On 3-1-40 during amputation of the left leg through its upper third, almost complete replacement of the muscles by fibrofatty tissue and absence of bleeding from the vessels were noticed On 10-2-40 he was discharged with a properly healed stump Re-examination of the stump in December 1940 showed good function in the muscles of the left thigh and the stump

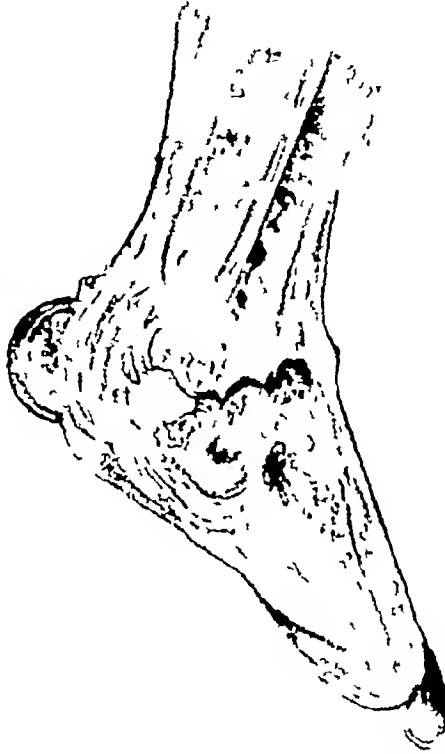


Fig 6 Naked eye section of the amputated leg—(painting) the leg wasted, skin wrinkled and pigmented, the foot had lost its arch, the soft tissues of the leg were pale and mostly fatty The tendons were wasted and translucent The muscles appeared to be replaced by pale fibrous tissue, the articular cartilages have disappeared, disorganisation of joint cavity, talus and navicular were not recognisable, rarefaction of cuboid and cuneiform bones

*Report on the specimen removed at amputation*—To the naked eye the leg was somewhat wasted, the skin wrinkled and deeply pigmented The ankle joint showed no appreciable swelling The foot had lost its arch, the sole was slightly convex in the centre, where it was marked by a perforating painless ulcer The dorsum of the foot was free from swelling The skin, like that of the leg, was dark, pigmented, wrinkled and eczematous The little toe was partly overriding its neighbour which was somewhat depressed On section, the soft tissues of the leg were pale and mostly fatty The tendons were wasted and translucent The muscles appeared to be replaced by translucent soft friable pale grey fibrous tissue for about  $1\frac{1}{2}$ " of their lengths The joint cavity was completely disorganised with disappearance of articular cartilage The talus and the navicular with their articular surfaces were not recognisable in the soft friable breaking down fibrous tissue which had replaced them The cuboid and the cuneiform bones were rarefied and their joints sclerosed (Fig 6)

Neither frank suppuration nor osteophytic new bone formation was in evidence The necrotic base of the perforating ulcer of the sole was continuous with the crumbling

tissues of the disorganised ankle and tarsal joints. Microscopic examination of sections of joints of the foot showed (a) rarefied cancellous bony trabeculae with fibrofatty marrow filling the wide cancellous spaces at the periphery (Fig 7), (b) areas of dense sclerosis forming scattered fragments of osteoid trabeculae (Fig 7) and (c) foci of



Fig 7 Microscopic examination of the joints of the foot —

- (a) Rarefied cancellous bony trabeculae with fibro-fatty marrow filling the wide cancellous spaces at the periphery
- (b) Areas of dense sclerosis forming scattered fragments of necrotic bone deeper towards the centre



Fig 8 Foci of chronic inflammatory granulation tissue surrounding fragments of necrotic bone deeper towards the centre



Fig 9 Section of the muscles of the calf —showed almost total absence of normal muscle fibres and replacement by live fibrous tissue and fat in which a few myoblastic fibres were embedded

chronic inflammatory granulation tissue surrounding fragments of necrotic bone deeper towards the centre (Fig 8). Sections of the ulcer on the sole of the foot show cicatrising margins and granulating base continuous with the disorganised sclerosed tissues of the joint. Those of the muscles of the calf exhibited almost total absence of normal muscle fibres and replacement by fibrous tissue and fat in which a few scattered myoblastic fibres were embedded (Fig 9). The vessels, though showing a certain amount of intimal thickening and sclerosis of the media, were patent and free from thrombosis.

### Discussion

*The Spinal defect*—Spina bifida is by no means an uncommon condition, it is said to occur once in every 1,000 births, the case reported above, with bony changes in the skeleton is the second to come under the observation of one of the writers (Narasimham).

*Signs and Symptoms*—The occult form of rachischisis may give rise to no disability. Onset of symptoms in this form of rachischisis occurs, however, during early adult life when the spinal cord moves slightly upwards in its canal and is attributed to the drag on the cord by the duramater by a fibrous membrane (Membrana reuniens) which passes from the deep aspect

of the skin over the spinal defect to the membranes of the cord. The resulting signs are paralytic, causing bilateral deformities such as the pscavus form of talipes, paralysis of sphincters and the development of trophic ulcers. The case under report is unique inasmuch as in spite of the advanced atrophic changes in the muscles, motor disability was inconspicuous. The changes were principally sensory and trophic.

*Pathogenesis*—Loss of trophic influence and joint sensation have been mentioned as the principal factors operating in the pathogenesis of the disorganisation of the joint. Eloesser's experimental observations on the denervated joint indicated that repeated injuries played an important role in the initiation of the joint changes. Thus it would appear that trauma initiates inflammation, that analgesia of the joints, enabling the continued use of the inflamed joint, conduces to repetition of the trauma and chronicity of the joint pathology and that perverted trophic influence leads to the disordered repair. New bone formation is alleged to be a later process depending on the liberation of a large amount of calcium which readily precipitates in the ossifiable medium of the vicinity.

The painlessness of the process and the absence of the functional failure of the affected joint made the detection of the joint changes difficult. Fibroid ankylosis of the joint keeping pace with the destruction prevented in this case the onset of dislocation and the formation of a flail joint which have been described.

Interference with blood supply as a probable cause of neuropathic bone and joint disease is an important factor. Sudden deprivation of blood supply as in spasm of vessels produce necrobiosis as in Volkmann's ischaemic contracture, in the case under discussion it was discovered that there was no bleeding from the arteries during the amputation, only the veins were patent. In a case of N2, (non-infective type of leprosy) in a male aged 15, there was a dislocation at the subastragaloid joint of the right foot of two years' duration with a pressure sore on the sole. Amputation was performed through the leg, and histological examination of the artery showed marked medial sclerosis.

Aseptic necrosis of bone due to interference with blood supply is a factor in osteochondritis although there is pain in this condition. Degenerative tissue changes in muscle and bone occur in any prolonged obstruction of the arterial blood supply such as embolism, angiosclerosis, Raynaud's disease, syphilitic endarteritis and in elephantiasis of legs (Narasimham).

It is well known and it is the experience of one of us (Narasimham) that lumbar ganglionectomy has been found to be very useful in relieving the painful condition of the joints in the infective type of polyarthritis (Rheumatoid arthritis).

Charcot's disease is still an unsolved problem. Interference with the trophic nerve supply to the joint cannot be the only explanation on account of the suddenness of the onset of the affection and on account of the condition being usually confined to one joint.

*Pathology*—The three morbid anatomical types, the atrophic, the hypertrophic and the osteoarthritic, represent merely variations of clinical interest rather than distinct pathological entities. The case under report belonged clinically to the atrophic type but was not devoid of histological evidences of osteogenic repair. Anatomically they perhaps represent degrees of severity of the process. In the atrophic variety, the destruction is severe and repair limited. In the more common hypertrophic variety the progress is subacute and progressive, destruction and aberrant repair keeping pace with each other. The rare osteoarthritic variety with its limited destruction and repair represents a mild lesion.

Anatomical peculiarities of the joint governing the range of movement and predisposition to trauma perhaps determine the type of reaction. In the case under report the naked eye external appearance of the ankle joint and foot was least striking. The continued use of the limb in this case had apparently no influence on the initiation of the hypertrophic or gross osteoarthritic changes. The hypertrophic changes are more commonly seen in syphilitic neuroarthropathies than in syringomyelic cases. As the essential feature of a hypertrophic variety is the greater extent of exudative reaction, viz., necrotic liquefaction and excessive changes of repair there is reason to consider it as an allergic complex. There was no appreciable swelling or deformity beyond the loss of the arch of the foot but there was a perforating ulcer over the centre of the slightly convex sole of the foot. The erythema and congestion of the skin said to be present over the affected joint perhaps apply only to the fair skinned European races. In this case the skin over the joint shared in the hyper-pigmentation (dark) observed over the tumour and rest of the limb. The congestion and oedema of the skin were perhaps contributory to the unhealthy eczematous appearance of the skin of the dorsum of the foot in this case. The deformity due to shortening of the limb was masked by the tilting of the pelvis and scoliosis of the vertebral column.

The congenital defect in the development of neural arches may be complete with protrusion of the contents of the spinal canal or may be closed by a fibrous or bony membrane, underneath which the hernial sac and its accompanying tissues persist (spina bifida occulta). The presence of a fibro-osseous plate overlying the spinal defect in the case recorded above would bring it under the latter category. The frequency with which these defects are situated in the lumbosacral region has been explained by pointing out that this part of the spinal canal is the last to close during development. While the sacral defect usually gives rise to meningoceles, those in the lumbar region are usually meningomyeloceles and are alleged to be the

commonest forms of rachischisis Both these forms of rachischisis are incompatible with life to adult age Syringomyelocoele is a rare form, characterised by great distension of the central canal and consequent thinning of the nervous tissues of the cord and accordingly for obvious reasons it cannot occur below the level of the second lumbar vertebra Clinically there are loss of sensation, chiefly of pain and temperature sense, and muscular atrophy If the disease affects the pyramidal tracts, it results in spastic paralysis Atrophy of the trunk muscles is followed by scoliosis, Albee records thickening of bone resulting from trophic disturbance

One of us (Narasimham) in his hospital experience has seen all varieties of Charcot's joints in hips, knees, ankles, they were all parasyphilitics No case has been seen among cases of anterior poliomyelitis so far



Fig 10 Lumbo-sacral bifid spine

*The Lumbar swelling*—Small tumours, most commonly lipomata or dermoids but occasionally also angiomas or lymphangiomas, often surmount the spinal defects, projecting either into the canal or towards the skin surface, which is usually rough, wrinkled and often hairy The pad of fat forming the diffuse swelling over the spinal defect in this case can scarcely be called a neoplasm as it exhibits neither potentialities of progressive growth nor encapsulation It is much better constructed as a local aberrant adipose hypertrophy of the subcutaneous connective tissue which is favoured by the failure in the growth momentum of the spinal canal leading to the suppression or defective formation of the posterior spinal bony arches

### Summary

1 A case of rachischisis with certain unusual features is described, the unusual features in this case are —

- (a) the age of onset of trophic ulcer is 19
- (b) the patient's present age is 26, few people live up to this age
- (c) the occurrence of a bony mass representing the fused spinous processes over the lower part of the lumbar region, no reference is found in the literature regarding the presence of a bony mass
- (d) the changes in the muscle fibres and blood vessels

2 Pathogenesis of neuropathic affections of the joint is discussed, Charcot's disease is still an unsolved problem. Interference with the trophic nerve supply to the joint cannot be the only explanation on account of the suddenness of the onset of the affection and on account of the condition being usually confined to one joint. Interference with blood supply is in the opinion of one of us (Narasimham) an important additional factor.

3 Details of a case of osseous changes in a case of spina bifida without sensory loss and of a case of trophic disturbances in a case of spastic paraplegia are appended to this paper on account of their rarity.

Thanks are due to the staff of the Barnard Institute of Radiology for the radiograms, the department of Pathology, Medical College for the painting and micro-photographs and to the Superintendent, General Hospital, Madras for permission to report the cases.

### APPENDIX

(1) *A case of Spina bifida with bony lesion*—B, a female aged 18, was admitted with deformities in 1939 into the hospital. There was a soft lipomatous swelling over the upper part of the lumbar spine LI and II (Fig 10). She could move about but only with difficulty on account of her deformities in the lower limb, she had no vesical or rectal disturbances. Her left knee was in flexion, there was marked thickening, to the extent of two and a half inches in width, of left tibia. The head of the right femur was absent, great trochanter was on a higher level, there was lumbo-dorsal scoliosis with convexity to the right (Fig 11), the feet were normal and there were no sensory disturbances, the upper part of the vertebral column is normal except for the presence of a small cervical rib on the left side. The serum reaction was negative, there were no evidences of congenital syphilis or history of illness to suggest that the patient had acute epiphysitis of the hip which would explain the absence of the head of the femur, the presence of marked thickening of the tibia in this case of spina bifida without any sensory disturbances is remarkable.

(2) *A case of neuropathic disturbances in foot in a case of spastic paraplegia—*S, a male, aged 13, was admitted on 5th of March 1938, with bilateral contracture at the hip and knee of six years duration in a case of spastic paraplegia. Serum reaction was

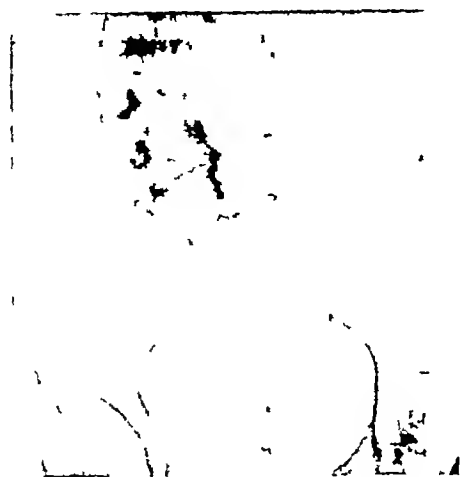


Fig 11 Radiogram showing lumbo-dorsal scoliosis, absence of head of the right femur



Fig 12 Skiagram showing changes in the foot

negative, examination of cerebro-spinal fluid showed that the fluid was not under pressure, cerebrospinal fluid —Reaction was 2 1 c c negative and 0 5 c c positive weak

Chemical examination of cerebrospinal fluid—Protein 20 mg%

Chloride 700 mg%

Sugar 63 mg%

Radiogram shows destruction of the Talo-navicular, cuneiform metatarsal joints and metatarso-phalangeal joint of the big toe of the right foot (Fig 12)

# ON DUPUYTREN'S FRACTURE WITH REPORT OF A CASE

BY

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Dupuytren's fracture seems to be a rare lesion. When a case occurred and several well known books on fractures were referred to, it was rather surprising to find out that many do not even mention the condition, some deal with it as being synonymous with Pott's fracture, while some others get over the trouble by grouping the abduction fractures of the ankle region under the name "Pott—Dupuytren fractures". Where a specific mention of the condition is made, the description is not quite accurate in good many cases. For these reasons and from the fact that the radiograms of the case reported here show clearly that the usual conception of Dupuytren's fracture is inaccurate, it has been thought worth the while to record this case.

What the English text-books call Pott's fracture, is known in France as Dupuytren's fracture after the name of the French Surgeon, Dupuytren. The Dupuytren's fracture of English text-books on the other hand is a rare type involving diastasis of the inferior tibio-fibular joint (Ogilvie, 1936).

Put in simple terms the fracture may be defined as one of the varieties of the fracture dislocations of the ankle joint in which the inferior tibio-fibular ligament is ruptured. However, the ordinary text-book conception of the fracture is not quite correct. The impression one gets from text-book descriptions is that because of the rupture of the inferior tibio-fibular ligament the astragalus gets displaced upwards between the lower ends of tibia and fibula and lies free from all attachments to either of them. This is not so. The astragalus always retains its attachment to the external malleolus, at least by the posterior fasciculus of the external lateral ligament. This ligament is so strong that it never ruptures. The fibula is fractured at its lower third above the level of the external malleolus. In whatever direction the fibular fragment is displaced, it moves carrying with it the attached astragalus and therefore the foot. These facts are made exceedingly clear by the following statements of Lambrinudi (1934). He says "The astragalus is attached to the fibula by the posterior fasciculus of the external lateral ligament. This ligament is so powerful that it has been never known to rupture even when fractures have been experimentally produced on the cadaver. The astragalus and the lower end of the fibula can be regarded therefore as inseparable. It is often taught that in cases of Dupuytren's fracture, the astragalus acting as a wedge separates the tibia from the

fibula widely and is drawn up between them. It is doubtful if this ever occurs. What happens is that the fibula fractures (as a result of abduction violence at its weakest point about  $3\frac{1}{2}$  to 4" above the tip of its malleolus) and if there is an upward thrust such as might happen if there was some weight bearing, then the astragalus carrying with it the lower fragment of the fibula is displaced not only outwards but upwards as well giving the impression that the tibia and fibula are splayed out. The astragalus is inseparable from the fibula, so it cannot be pushed up independently between the two bones."



Fig 13



Fig 14

Fig 13 & 14 Show the condition of deformity in two views of a case of Dupuytren's fracture at time of admission (13-4-40)

Figures 13 and 14 show the condition of a patient admitted with violent injury to the ankle region and figures 15 and 16 show the radiograms of the fractures

The fracture of the fibula about  $3\frac{1}{2}$ " above the tip of the external malleolus and the avulsion fracture of the internal malleolus are obvious. The inferior tibio-fibular syndesmosis is broken and the astragalus is presenting in the gap between the tibia and fibula, but a careful examination will show that the astragalus is *not* pushed up in the gap more than what can be accounted for by the tilt of the fractured fibular fragment. It is still retaining its normal relationship to the external malleolus and is pulled up along with it. In other words, the pushing up of the astragalus is more apparent than real. Figures 18, 20 and 22 also show a fracture of the posterior lip of the tibial articular surface, (the so-called fracture of the 3rd malleolus), a fairly frequent occurrence. This is not quite obvious in the skiagrams 15 and 16

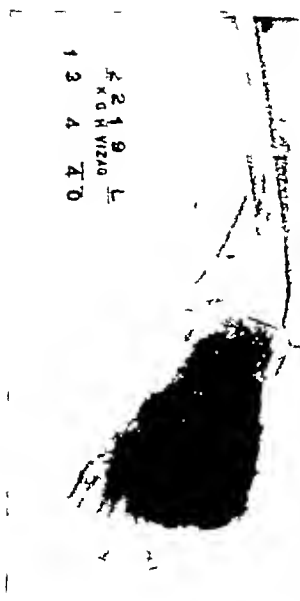


Fig 15



Fig 16

Radiograms of the conditions at time of admission A P and lateral views

**Case Report**—The patient was a man of 32, a cooly working in a house construction. It was difficult to get a clear history as to the exact mode of violence, but what could be made out was as follows. The patient happened to be standing with the outer aspect of his right foot abutting against some logs of wood when a heavy load suddenly swung on to the lower and inner aspect of his right leg causing him to fall over, outwards. There was very marked and obvious deformity (Figs 13 and 14) and the skin was very tightly stretched over the tibial end. It was indeed very lucky that the injury did not become compound.

Soon after admission manipulative reduction was performed under a general anaesthetic and a non-padded plaster cast applied. Skiagrams taken now showed imperfect reduction. It was now in the typical 2nd degree Pott's fracture position (see figures 17 and 18).

Manipulative reduction was therefore repeated the next day. Here, one has to digress a bit. Some at least of the cases of imperfect reduction of fractures around the ankle joint is due to a misunderstanding of the method of reduction. To correct the abduction and eversion displacement that is present in these fractures it is sometimes advised to hold the heel firmly in the palm of one hand and with the other to adduct and invert the foot forcibly and firmly. But the displacement is not corrected at all by this manoeuvre. All that happens is a straining of the subastragaloid and mid-tarsal joints. It is indeed surprising that some of the latest text-books still persist in describing this method. The correct procedure is to apply firm



Fig 17 & 18 The astragalus is still out The skiagraphs show a position of typical 2nd degree Pott's fracture, *viz*, fracture of lower end of fibula and of internal malleolus, and the astragalus (and with it the foot) abducted and everted

inward pressure on the external malleolus itself—after overcoming the upward and backward displacement by traction on the heel, and forward pull on the foot (with the knee flexed to relax the gastrocnemius) With this object in view the following manoeuvre was adopted in this case with perfect success

Under a general anaesthetic with the knee flexed to a right angle and the inner aspect of the leg resting on a sand bag in such a way that the ankle region was protruding clear of it, the heel was firmly pulled downwards and forwards and at the same time the external malleolus was firmly pressed on to the internal malleolus The fragments were felt to slip back to place easily Having thus reduced the fragments to position, the whole leg was drawn clear of the table and allowed to hang over the edge with the knee flexed at right angles In this position a non-padded plaster cast was moulded, with the foot at right angles to the leg, and "the second toe in the vertical line drawn from the centre of the patella" (Lambrinudi, 1934) The foot was held in neutral position (*i.e.*, neither inverted nor everted) For reasons already said, it is not only unnecessary but unwise to keep the foot inverted The plaster was applied from the tip of the toes to the tuberosities of the tibia moulding it properly over the bony points, and holding the joint firmly and strongly in the corrected position throughout the time that the plaster was setting, lest the displacement should recur within the plaster

For a perfect functional result it is highly important that the astragalus must be accurately replaced in its normal position Otherwise there is inequality of the opposing articular surfaces with resulting weakness and pain on weight bearing and ultimately osteo-arthritis of the joint The test

for accurate reduction is that the articular surfaces of the tibia and astragalus are absolutely parallel to each other as shown in skiagrams taken both in the antero-posterior and lateral views (See figures 19 to 22)



Fig 19

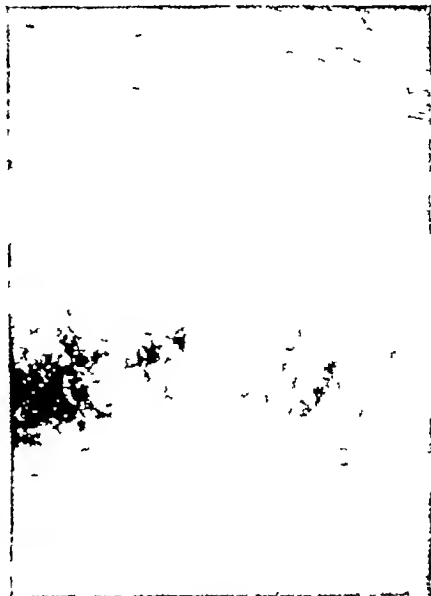


Fig 20

Skiagrams after proper reduction A P and lateral views (16-4-40)



Fig 21



Fig 22

Skiagrams after removal of plaster (on 17-7-40) Note the absolute parallelism between the tibial and astragalar articular surfaces Note also the "3rd malleolus" displaced upwards forming a "step" away from the joint

The astragalus is ideally under the tibio-fibular mortice. It is this that counts. The fact that the fibular fragments are not in position is of no moment. The posterior marginal fragment is displaced slightly upwards (Figs 18, 20 and 22), and a 'step' is formed at its junction with the main articular surface, "but since the fragment is displaced away from the joint and not into it, this is unimportant" (Watson Jones, 1940)

*After treatment*—To avoid oedema the leg was slung up from a cradle for the first three days. Six weeks later the plaster cast was renewed, a walking iron fitted on and the patient allowed to walk about. 24 days still later, this was removed and a Delbet's plaster applied and he was allowed to walk about with it. A month later (i.e., 95 days after the injury) the Delbet's plaster also was removed and the patient allowed to bear full weight on the leg. He was able to walk in comfort with toes pointing straight in front (Figs 23 and 24). Active movements of the ankle and subastragaloid joints were now almost complete and absolutely painless.



Fig 23

Condition when the Delbet's plaster also was removed and the patient allowed to bear full weight and walk



Fig 24

He very soon resumed duty which involves carrying heavy weights as a cooly. He is able to do this without any disability and was found continuing his work a few weeks ago, i.e., well over  $1\frac{1}{2}$  years after resuming full work.

It is the opinion of some that "operation is always necessary in the treatment of Dupuytren's fracture" (Ogilvie, 1936). It is argued by them that "while the fragments can be restored to exact position by manipulation,

the external malleolus can only be retained in its correct relationship to the tibia by a degree of pressure which if applied throughout the time necessary for repair of the torn ligaments would inevitably lead to sloughing of the skin" (Ogilvie, 1936) To avoid this it is suggested that "the fibula should be exposed and the external malleolus fixed in position by a screw" (Ogilvie, 1936) The case reported here shows however that proper reduction and restoration of full function is possible without resorting to operative measures

### Summary and Conclusion

1 A case showing the various features of Dupuytren's fracture is reported

2 Some misconceptions about the nature of the deformity as described in some text books and even in some big treatises on the subject of fractures are pointed out and the true nature of the deformity detailed

3 In fracture dislocations of the ankle region some of the bad results of treatment are due to a misunderstanding of the proper method of reduction The correct method of reduction is described

4 The test for correct replacement is absolute parallelism between the astragalar and tibial articular surfaces as seen in antero-posterior and lateral radiograms

5 Proper reduction and full restoration of function is possible in Dupuytren's fracture without resorting to operation Operation is not necessary in every case as is suggested by some

*Acknowledgments*—My thanks are due to Major F A B Sheppard, OBE, IMS, for permitting me to publish this case, to Major J F Shepherd, IMS, for permitting me to treat his case, to Dr Benjamin and Dr P Kesavaswami for the skiagrams and photos reproduced here, and to Dr P S Janardhanan for referring me to the excellent article on fractures near the ankle joint by Lambrinudi

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-

# FRACTURES OF THE NECK OF THE FEMUR

BY

RICHARD E STRAIN, M C P & S (MANITOBA), M D, M C C (CANADA),  
MIRAJ MEDICAL CENTRE, MIRAJ, S M C, INDIA

Fractures of the neck of the femur treated by internal fixation has revolutionized the treatment and results of this fracture. When it is realized these patients are out of bed within a few days of operation instead of spending 4 to 6 months confined to bed, its value is readily appreciated by the laymen from a financial viewpoint. Physicians appreciate the early mobilization as greatly aiding union and preventing complications that used to be frequently fatal. Results in 1485 intra-capsular fractures treated by 100 surgeons showed union occurred in 89.4% of cases with a mortality of 8.5%.<sup>1</sup> Recently Cashberg<sup>2</sup> has emphasized that extra-capsular fractures of the femur show a high mortality—40% in their series—when treated by the usual recumbent method whereas use of a lag screw for internal fixation of selected inter-trochanteric fractures secures for these patients the same benefits that accrue to intra-capsular fractures—namely the short hospitalization and early mobilization of an elderly patient.

Various types of pins, screws, and nails have been used. Martin<sup>3</sup>, Brewster<sup>4</sup> and Geckeler<sup>5</sup> have advocated and secured satisfactory fixation by two screws introduced subcutaneously under antero-posterior visualization with the fluoroscope. Recently Geckeler and Tuttle<sup>6</sup> have introduced instruments which for simplicity, rapid introduction, accurate fixation, particularly in the lateral placement of screws and lack of disability to the patient, provide the best results the author has seen.

As Geckeler and Tuttle point out, "the torsion of the neck of the femur varies in wide limits, from -20 degrees (posterior twist) to +38 degrees (anterior twist)." See Fig 25 re-produced from Geckeler and Tuttle's

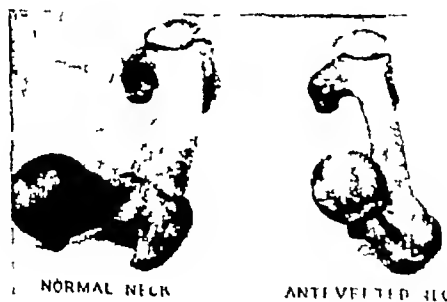


Fig 25 Showing the normal variations of torsion of the neck of the femur (From Geckeler and Tuttle, S G O 72, 106)

manuscript which demonstrates this normal variation. In every method used in introducing fixation this variation has produced error in all fixation as the visualization of the lateral position of the pin is not done under vision but is done blindly so the guide pins or screws may miss the line of fracture and protude outside the neck. This was overcome by Tuttle who devised a steel pin and block which when fastened to the cannula guided the screw exactly to the central axis of the neck in the lateral plane regardless of the angle of torsion. The cannula is parallel to and exactly  $\frac{3}{4}$  inch from the pin. Figures 26, 27 and 28 re-produced from Geckeler and Tuttle's manuscript show the instruments and their use. The author has had a very satisfactory instrument made on this pattern by Powell, Ltd of Bombay. Ordinary screws from the bazaar, silver plated and with the head made to fit the screw driver, have been used as inquiries have disclosed machinery for

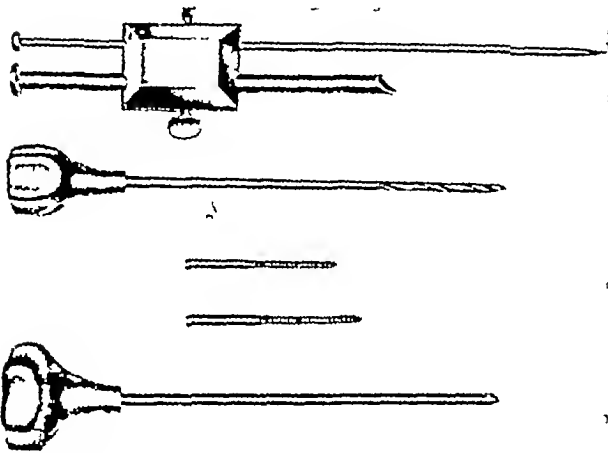


Fig 26 Instruments used in Subcutaneous Fixation of neck of the Femur (after Geckeler and Tuttle)

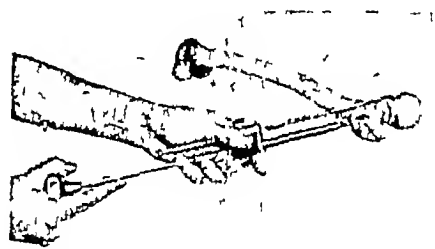


Fig 27 Showing method of placing instrument of neck of femur (After Geckeler and Tuttle)

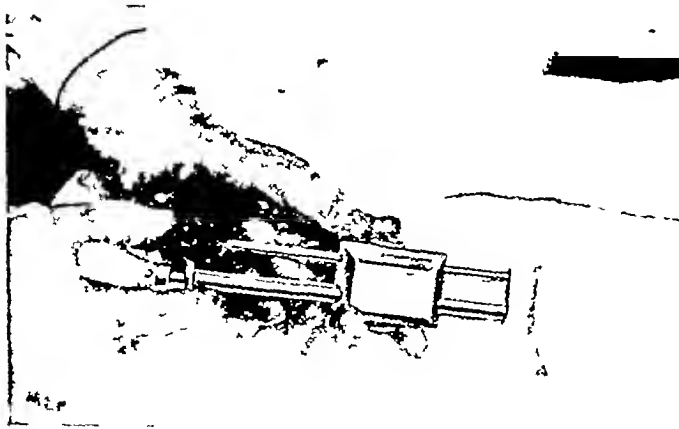


Fig 28 Method of inserting pin used by author

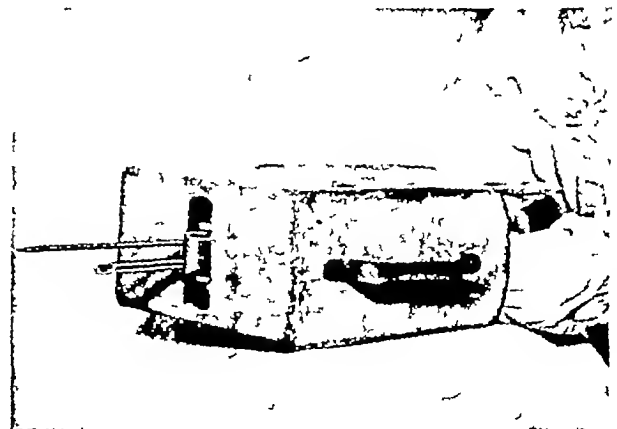


Fig 29 Box through which pins are inserted when done under fluoscopic vision (After Geckeler and Tuttle)

making screws three inches or more in length is not available in India. Screws are 3,  $3\frac{1}{4}$ ,  $3\frac{1}{2}$  and 4 inches in length and are of 11, 10, and 12 gauge. Steel screws are usually used and not removed. It remains to be seen whether removal of silver plated screws is necessary.

Geckeler and Tuttle inserted their guide pin and screws under direct fluoroscopic vision. This necessitates the use of a lead lined box shown in figure 29, re-produced from their manuscript, for protection of the operator's hands. I have modified this technique by doing away with the box completely as it seemed awkward and unduly trying. To accomplish this it was necessary to modify the technique for guiding in the pin. The direction of the neck of the femur was estimated by drawing a line from the spine of the pubis to the anterior superior iliac spine and the point 1 cm. underneath the mid point of this line, which corresponds to the highest point of the head of the femur<sup>7</sup>, was marked by a scrap of lead fastened with adhesive. A second point was similarly marked 6-8 cm. below the tip of the greater trochanter.

After reduction of the fracture, the patient is X-rayed for position of the fragments and the lead markers. Local or intra-venous anaesthesia with pentothal of sodium is then given, the field prepared and from the position of the markers, it is relatively easy to insert the guide pin in an accurate direction. A second X-ray is immediately taken and the position checked. I have found it useful to measure the length of the cannula on the guide pin and mark this, additional markings are made on the guide pin at  $\frac{1}{2}$  inch lengths and from the X-ray of the guide pin and its position in relation to the head and cannula, it is easy to quickly calculate the exact length of screw needed. This has been found to be a decided advantage as in some cases—such as the one illustrated—an excess of screw from the bone has caused the patient to complain of slight pain while lying on that side. Also Geckeler and Tuttle report failure of one case through use of too short screws. In some cases intra-venous morphine may be administered if the anaesthesia is of too short duration which does not happen frequently as the whole procedure takes little over 30 minutes. Those who use chloroform may choose to use this anaesthesia.

Figures 30, 31, 32 and 33 are skiagrams of a patient recently treated by this method. Figures 34 and 35 show the range of motion 10 days following fixation. The patient came two months after suffering an adduction fracture of the neck of the femur with coxa vara. Skiagrams in figure 30 showed the blood supply to be good to the head as evidenced by the decalcified appearance of the femur head—a most important point in deciding whether union may be expected. Apparatus for subcutaneous fixation had been ordered but was not available so for two months the patient was treated by skeletal traction through the tibial spine and a Thomas

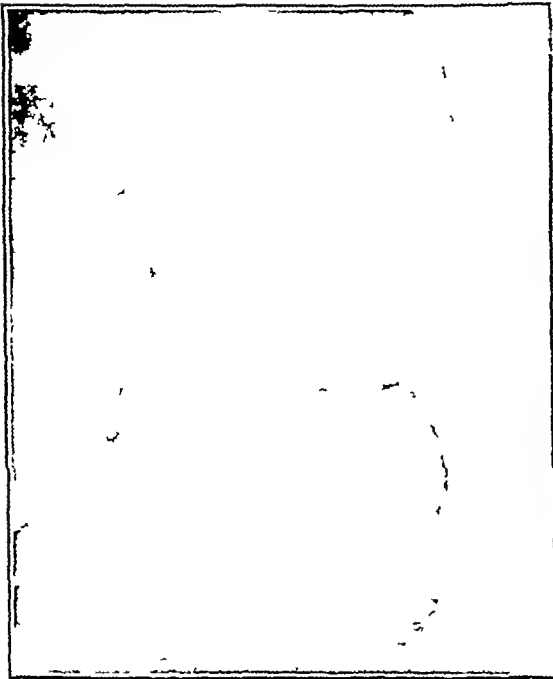


Fig 30 Fracture on admission and two months after occurrence. The blood supply to the head was good as evidenced by the density of the head, which is the same as decalcified femur

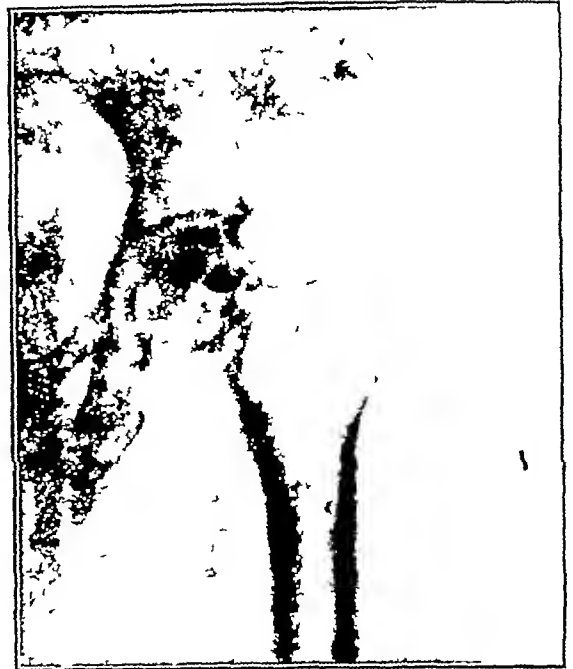


Fig 31 Fracture after pin traction and just before fixation with screws. The lead markers for insertion of the guide pin are plainly seen

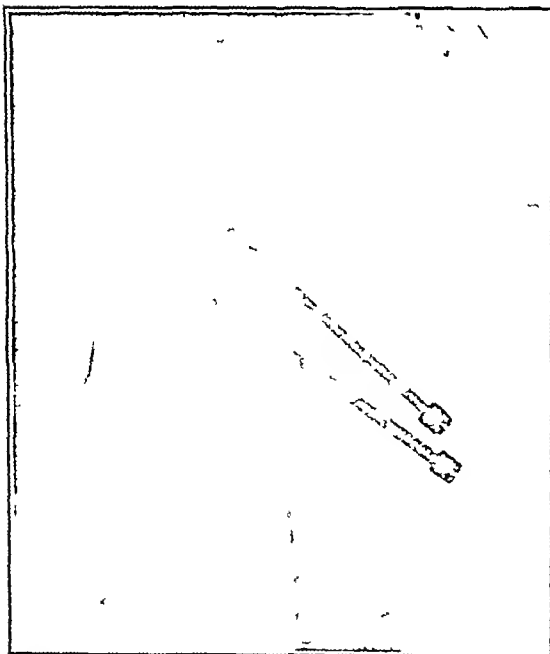


Fig 32 Anterior-posterior view showing the two screws in position

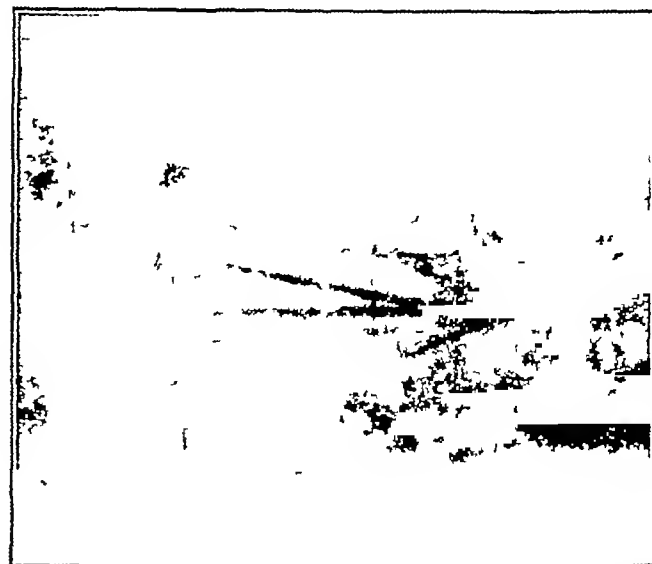


Fig 33 Lateral view showing the screws in good position

splint Skiagrams taken after two months and just before pinning seen in figure 31 show good position and some beginning union while the lead markers are seen in place

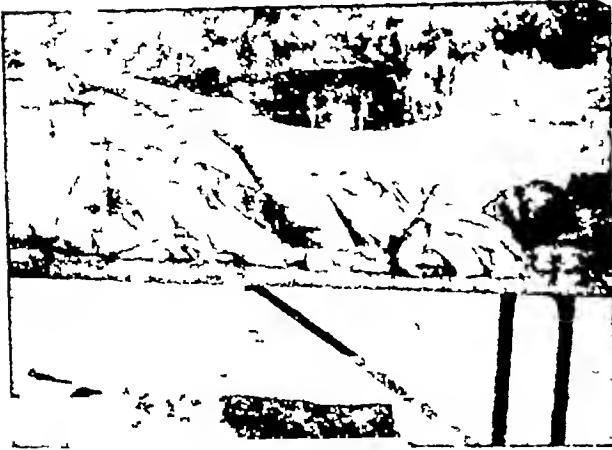


Fig 34 Showing the ability of patient to lift leg against gravity 10 days following fixation



Fig 35 Showing the range of motion of leg 10 days following fixation The small scar is seen where screws were introduced

Post-operative care in these cases is simple The day following fixation they are urged to put the feet over the side of the bed , by the second or third post-operative day they stand by the side of the bed without weight bearing on the injured limb , this aids in establishing their balance and they are then given crutches to use until skiagrams show union It should be remembered as Geckeler and Tuttle emphasize—that fractures occurring in the femur unite endosteally without any evidence being shown of external callus and that bone trabeculation is the only definite proof union has been accomplished In this case weight bearing was allowed 14 days after screwing as some union was present when the screws were inserted—ordinarily 6-8 weeks is required for this to take place , then weight bearing is permitted and a cane may be used

### Summary

Geckeler and Tuttle's apparatus for subcutaneous fixation with screws of fractures of the neck of the femur presents a simple, rapid, non-traumatic method of accurately fixing fractures of the neck of the femur, regardless of the torsion present, and permits mobilization of the patient within two days of fixation

Weight bearing is permitted only after trabeculation proves union has occurred. This usually requires 6-8 weeks.

A modification which does away with the necessity of working through a box in inserting the screw has been presented.

A rapid method of accurate calculation of the desired length of the screw has been presented. A summary of a case treated by the modified method is presented.

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## Visits to Clinics

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BY

LT-COL K G PANDALAI, F R C S, I M S (RETD)

Bologna —We in India are aware of the past contributions to the sum of Medical knowledge by the Italian Nation, but it is seldom that an Indian traveller gets a chance to see the practice of an Italian Hospital, chiefly on account of language difficulties. While passing through Italy, I decided to see, in addition to the usual Historical sights of Ancient Rome, some of the Hospitals of the city. Without introductions of any kind and with only a knowledge of English to take me along, I visited one evening at Bologna (Bologne), the famous Rizzoli Orthopaedic Institute presided over by Prof Putti. The Hospital is situate at some distance from the city proper and it takes about half an hour's drive by taxi to get there. The Institute is housed in a new building situate on a hillock and is devoted to the treatment of Orthopaedic cases only. Prof Putti's name is known all over the world, as he is the discoverer of several new and successful methods of treatment in his speciality besides equipment of his own design. Like all Orthopaedic centres at present, they make their own Orthopaedic appliances in a workshop attached. Putti was nearly 75 and was a tall, grey haired and handsome figure, had an active manner and was a quick operator. His operation Theatres are large and comfortable. White marble meets the eye everywhere and was rather a change from the grey or bluish tint of theatres seen widely in the United States. Spinal anaesthesia was the rule for operations where practicable. Local infiltration is practised when spinal injection is not possible, general anaesthesia with Gas and Oxygen was the least commonly employed. Prof Putti spoke English but few others in the Institute did so and to me conversation was impossible on account of my ignorance of Italian. The people are civil, but less communicative than in America.

I watched Prof Putti get through his morning's list of operations. I was the only visitor that day in the Gallery. Operations begin at 7-45 A.M. Putti operates on a table of his own design fitted with two X-Ray tubes which will take pictures in both the Antero-posterior and lateral views without moving the patient. He has his own special motor drill and bolt for fractures of the neck of the Femur. Silk is used for buried sutures and coloured sickworm gut for the skin. The Theatre linen is coloured green. Putti uses a headlight for most operations and is fond of wearing a cotton glove over his rubber glove.

Rome—Here I visited the Policlinico Morgagni situate in Via Plinio. This large and very old Hospital was housed in an extensive building which, like most buildings in Rome, appeared to be several centuries old and I was told that Prof Vittorio Puccinelli, one of the leading Surgeons of Rome worked in this Institution. He was unfortunately absent at the time, but his Assistant Dr Emilio Sasso who knew some English told me that another Surgeon of Eminence, Dr Urbani would operate the next morning. Accordingly the next morning I was at the hospital at the appointed hour and in spite of being held up at many entrances on account of my ignorance of Italian, I was at last able to see Prof Lucio Urbani perform a series of operations. He operated three times a week and worked in a small operating room, the sterilising was done in a corner of the same room. Visitors stood all round the table and as the room was packed with the usual equipment of a Theatre, the congestion was extreme. Dr Urbani uses, for preference, spinal or local anaesthesia, but also general anaesthesia with Nitrous Oxide and Oxygen as required. He does not speak English and throughout he was speaking in Italian about the work in hand. He is a comparatively young man and was only 48 when I visited. He uses instruments of a specially heavy pattern. Tr Iodine was preferred for painting the skin. He uses the midline incision for laparotomy, but excises the linea alba in most cases and is fond of large gauze packs left in the abdomen when drainage is required. Silk is employed for the skin and where infection in the abdomen is feared, he packs the cavity with gauze after pouring into it a quantity of anti-peritonitis serum.

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In the vacancy caused by the election of Dr N C Joshie as President at the last Annual Conference held at Calcutta in October, 1941, Dr A V Baliga has been elected a member of the Governing Body under the powers vested in the Governing Body as per Section 15 (c) of the Rules and Regulations

\* \* \* \* \*

The attention of all Members is particularly invited to the circular letter, regarding the Library of the Association, sent along with the December Issue of the Journal. Some generous contributions have already been promised. It is hoped further contributions in money and books will come in in the immediate future.

\* \* \* \* \*

The album of the Foundation Members is still far from complete. Those who have not sent in their photographs are requested to do so at an early date.

\* \* \* \* \*

## SUBJECTS FOR DISCUSSION

5th Meeting, Feb 1943

- 1 Laryngeal Carcinoma by Dr H D Gandhi and Dr S G Joshi, Bombay
- 2 Injuries of the Thorax by Dr C S Patel, Bombay
- 3 Surgery of the Gall Bladder

6th Meeting, 1944

- 1 Traumatic Surgery of the Skull by Dr R N Cooper, Bombay
- 2 Carcinoma of the Breast by Dr N C Joshie, Delhi
- 3 Urinary Lithiasis by Dr L B Joshi, Karachi

7th Meeting, 1945

- 1 Carcinoma of Rectum by Dr C P V Menon
- 2 Enlarged Prostate by Dr S R Moolgavkar
- 3 Fractures of the neck of the Femur by Dr B N Sinha

8th Meeting, 1946

- 1 Carcinoma of the Cheek by Dr B M Joly
- 2 Tuberculous disease of the Spine by Dr S P Srivastava
- 3 Hare Lip and Cleft Palate by Dr S C Sinha

# Association of Surgeons of India

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The Association of Surgeons of India offers an annual prize of the value of Rs 150 to the best essay based on original work on a subject to be decided by the Governing Body of the Association and announced every year

The following are the conditions of the award —

1 The competition is open to all qualified medical practitioners registered in India, who have been in practice for not more than 10 years after qualification

2 The essay should be based on original work and should be written in English

3 It should be type-written on one side of the paper only and should not contain the name or other indication of the identity of the competitor Four copies should be submitted

4 The name, address and qualifications, however, should be written on a separate sheet of paper and enclosed with the essay

5 The subject for 1942 is "Infections of the Foot" and the essay should reach the Secretary before the 1st October 1942

6 The copyright for the winning essay will remain with the Association of Surgeons of India and will be published in the Indian Journal of Surgery Other essays will be returned to the senders if accompanied by stamped addressed envelopes

7 The Governing Body may at its discretion withhold the prize if the essays submitted do not come up to the standard

8 All communications regarding the above are to be addressed to the Secretary, Association of Surgeons of India, Binfield, Kilpauk, Madras

C. P V MENON,

*Hony Secretary*

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# THE INDIAN JOURNAL OF SURGERY

Vol IV

JUNE 1942

No 2

## SURGICAL TREATMENT OF INGUINAL HERNIA

(Ayurveda)

BY

L A RAVI VARMA

At the outset it is necessary to point out that in most of the available printed works on Ayurveda, one meets with readings in texts that cannot stand a critical scrutiny in the light of direct experience, while the commentaries that have reached us are comparatively late productions full of inaccuracies and misinterpretations. Some of these are, of course, scribal or typographical errors, but many are not. Their origins are to be traced to other sources. This defect is very marked in the field of surgery where written words often may not be able to convey the full and exact meaning contemplated to one having no direct and intimate knowledge of the subject. With the vanishing of Gurukulas and Dharmasalas (hospitals), the chances for expert teaching and practical training have gone, they being replaced by mere book-learning at the hands of literary pandits having little or no claim to any practical knowledge in the subject. It is said that one of the well known commentators, Arunadatta, was only such a pandit and not one who had any medical training whatsoever. Such annotations and teachings by non-medical pandits have resulted in many misreadings and misinterpretations of texts. Boring of the pinna of the ear or excision of a bit of tendon from the thumb as surgical measures for the cure of hernia are samples of the final products of a succession of such wrong readings and misinterpretations of texts at the hands of non-medical pandits. While showing the nature of the real teaching, I shall try to point out how the wrong and untenable notions arose.

Hernia is designated, in Ayurveda, by the term "Antra-vriddhi". The name itself indicates that they had correctly apprehended the nature of the condition, (Antra-vriddhi=enlargement caused by intestines). The aetiology and pathology of the condition is described by Susruta as follows —

तारहरण बलवद्भिर्ग्रहवृक्षप्रपतनादिभिरायासविशेषैर्वायुरतिप्रवृद्धः प्रकुपितश्च स्थूलाग्रस्येतरस्य चैक-  
देशं द्विगुणमादायाधो गत्वा वङ्क्षणसन्धिमुपेत्य ग्रन्थिरूपेण स्थित्वाप्रतिक्रियमाणे च कालान्तरेण फलकोशं

प्रविश्य सुकशो रुमापादयति, आध्मातो वन्तिरिवातत प्रदीर्घ, शोषो भवति सशब्दमवपीदितश्चोर्ध्वमुपैति, विमुक्तश्च पुनराध्मायते तामात्रावृद्धिमसाध्यामिग्याचक्षते ।

By lifting of heavy weights, heavy wrestling, falling from trees (great heights) and such like severe exertions, the motility being badly accentuated and strained, some part of the large intestines or other contents of the abdomen ("itarasya cha"—this reading is found in certain Bengal editions and in old Kerala Mss) doubles itself (into a knuckle shape) and descends into the inguinal region (inguinal canal) and assumes the form of a swelling. If the condition is left untreated, it, in course of time, descends further and enters the scrotal sac causing a swelling there which resounds (like a leather bladder containing air). The swelling may be large and elongated in shape. If pressed, it goes up with a sound (reduces with a gurgling sound), but on releasing pressure swells up again (returns). This is Antravridhi, it is incurable (very difficult of cure). This description clearly shows that they had a very fair grasp of the problem.

In dealing with the treatment of the condition, their first advice is "to leave it alone" (वर्जयेदन्त्रहेतुर्कीं). This advice and the expression "asadhya" already referred to, denote that the results they obtained were not very satisfactory, they must have had a high percentage of failures to warrant such a statement. After this general advice, the operative procedure is described. For purposes of operation they divided hernias into complete (those that have descended into the scrotum) and incomplete (bubonocoele type), as there was some difference in the procedures to be adopted. The preparation of the patient consisted of, among other things, enemata to clear the bowels (वन्तिकर्मपुरस्कृत्वा).

General directions for preparations of patients for major operations are given elsewhere in the texts, they are not included here. But it may be said that the preparations are sensible and of a high order.

The operation is described in the following words — "

अप्राप्तफलकोशया वातवृद्धिर्मोहितः ।  
तत्र या वड्क्षणाया ता दहेदधेन्दुवक्रया ।  
क्षरमार्गावरोधार्थं कोशप्राप्ता तु वर्जयेत् ।

In cases where it has not descended into the scrotum 'Vatavridhikrama' is applicable. Here, (the principle is to) to cauterise it so as to cause occlusion of the passage (by promotion of adhesions).

How this cauterising is to be done is now described —

त्वच भित्वाद्गुण्ठमध्ये ददेच्छाङ्गविपर्ययात् ॥

Incise the skin and after doing an "angaviparyayam" cauterise in the middle an area about the size of an angushtham,

This is one of the places where gross misinterpretation has arisen, therefore this portion demands careful notice. "Angaviparyayat" is a use of the 'chathurthi' for 'thrithiya' (तृतीयायै चतुर्थिः), and denotes 'by the process of angaviparyaya,' 'after doing an angaviparyaya,' etc. Angaviparyayam means to turn inside out, to invert, etc. So also the word 'angushtham' means a measure equal to a finger's breadth, i.e., an inch nearly (vide Monier Williams). The text, therefore means, "to incise the skin, etc., till the hernia is reached and then to do an angaviparyayam, i.e., to turn the sac inside out by cutting it open and to cauterise on its inner side (madhye means inside as well)' for about an inch with a view to promote inflammatory adhesion. This was in place of the tying of the neck of the sac, the effect in both cases being almost the same. By taking the superficial sense of 'opposite' for angaviparyayam and 'middle of the thumb' for angushtha-madhye, the real sense got distorted and the teaching became to incise the skin on the thumb on the opposite side to which there is hernia and to cauterise there for the cure of hernia. It is noteworthy that the operation is meant to 'occlude the passage' (क्षरमार्गवरोधार्थं), This can never be achieved by cauterising on the thumb. It is want of practical knowledge that has created this trouble.

If the hernia is fully formed and particularly if the content is omentum वृद्धीवातकफादिमिके, vataviddhi is hernia containing intestines and kaphaviddhi is one containing omentum, etc., the same procedure is to be adopted with the addition of the resection 'snayu' (प्रवहेतु प्रयतः किन्तु स्नायुच्छेदोऽधिकस्तयोः) Here by the term snayu they mean the adherent excess of the sac portion lying in the canal as well as the omentum. How this is to be done is further described

शङ्खपरि च कर्णान्ते त्याक्त्वा यत्नेन सेविनीम् ।

व्यत्यासाद्वा सिरा विध्येदन्त्रवृद्धिनिवृत्तये ॥

(I am aware that the readings in printed editions are 'शङ्खोपरि' and 'सेविनीम्'; but I have seen in certain old Kerala Mss the readings 'शङ्खपरि' and 'सेविनीम्'. Here again the wrong readings found can only be the result of loss of anatomical knowledge.)

The text means "above the pubic spine (sanku=a spine, here it stands for the pubic spine, which is the only spinous process nearby), and ending at the 'hole' (karna=a hole, here it denotes the external abdominal ring, the 'hole' through which the hernia comes out), and protecting the spermatic cord (sevinī) excise the tube (sira), the snayu referred to above, transversely." That is, where the hernia is fully formed and where there is a definite sac, that sac is to be isolated and excised after protecting the spermatic cord, after which the same cauterising as before is to be done.

There appears to be no attempt to strengthen the wall, hence recurrences must have been very common. This perhaps is the reason why they classed the condition as 'asadhya' and advised not to interfere with it (वर्जयेत्).

By equating ear for 'kaina,' mastoid process for 'samkha' and cranial sutures for 'sevani,' the later-day teachers began to understand this operation as "boring a hole in the pinna of the ear." If the original authors wanted to describe such a boring they could have easily done that without bringing in terms 'samkha,' 'sevani,' or 'sira.' Further the term 'karnanthe' can never mean the middle of the pinna, nor can the term 'karnathar' stand in the place for metrical exigencies. The sutures of the skull, and the mastoid process are so far removed from the middle of the pinna as not to deserve any mention in a boring operation in the middle of the pinna, nor is there any 'sira' noticeable to the naked eye in the area for vedhana, if by sira a vessel or tube is meant. The mistake here is evidently the result of want of practical knowledge in surgery as well as anatomy, of the later-day redactors and commentators. A critical study clearly shows that the original authors knew what they were about.

The texts before us, perhaps, would have undergone many redactions at the hands of ill-equipped teachers. But the kernel of the teaching is at the least not less than 3,000 years old as the name of Susruta is found mentioned in Mahabharata. Bharatavarsha was holding up the torch of knowledge and culture when the rest of the then world was steeped in utter darkness and despair. May her torch once again blaze forth and carry Light and Comfort to Hearts and Homes now steeped in another form of Darkness and Despair from the wanton vagaries of rank Materialism and Kultur.

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# SURGICAL ASPECTS OF FILARIASIS\*

BY

U P SINHA, F R C S (EDIN)

Mr President, Ladies and Gentlemen,

My own helplessness in dealing with the various surgical manifestations of Filariasis has led me to engage in this discussion. I am afraid I shall not be contributing anything towards the knowledge of the subject but I hope to learn a lot from the discussions that will follow.

Surgical aspects of Filariasis cannot be dealt with as an isolated problem. The ravages of Filarial infection are problems to the physicians and surgeons alike. If the disease is stamped out the hideous looking arms and legs will automatically become a rare sight. Therefore finding out a specific is the first charge on the medical profession. With the active help of preventive science there is no reason why the world should not be freed of this scourge.

So far as my province, the province of Behar, is concerned Filariasis is no less a plague than plague itself. To my mind the cause of neglect of this disease is that it does not kill quickly. But looking at it from a wider angle it is at once evident what a colossal loss of working capacity it is to our nation. The temporary, partial, and total disabilities arising out of Filarial infection, our profession, as well as the public, have learnt to accept with calm resignation.

Manson discovered the mosquito cycle in the development of *Filaria Bancrofti* in 1878 and in the year 1880 he described Filarial periodicity. The larvae are extruded from the proboscis of the mosquito in the act of biting and by moving along the skin of the definitive host they pierce the epidermis and enter the body. The exact route by which they reach the lymph glands and the length of time required before the larval *Filaria* attains maturity are still matters of conjecture. Lymphatic channels being wider than the vascular channels larvae easily gain an entrance to them. Dr Ramamurti's animal experiments in lizards are definitely in favour of a lymphatic pathway. It is a little difficult for the larvae to enter the blood current as they are too large for the capillaries and besides it is impossible to get beyond the capillaries of the lungs. In the lymphatic channels and the glands the larvae attain maturity. The adult *Filariæ* (*Wuchereria Bancrofti*) produce embryonic forms which invade the blood stream. On escaping from the gravid female these Micro-filariæ may remain in the lymph or migrate through the lymph capillaries into the blood stream. The Micro-filariæ

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\* Read at the 4th Annual Conference of the Association of Surgeons.

*Wuchereria Bancrofti* exhibit nocturnal periodicity. The periodicity can, however, be inverted by transposing the hours of sleeping and waking. The nocturnal presence of these micro-filariae in the blood is of great diagnostic aid.

*Pathological effects of the adult Filaria*—*Wuchereria Bancrofti* are able to exist in considerable numbers in the human body without producing any symptoms whatsoever. In fact the greater the number of embryos in the peripheral blood the fewer the inconveniences the affected man appears to feel from their presence. It is a moot point whether the living adult *Filaria* produces any change in the surrounding lymphatics or the lymphatic glands. Ray, however, has been able to remove apparently healthy parasites from enlarged lymphatic glands which have shown marked pathological changes. After death the adult worms get calcified and are found in glands and lymphatic vessels throughout the body. In this calcified condition they begin to act like irritants and mechanically block the lymph channels. Giant cell systems and fibrosis, especially of the lymph glands form round the worm. In *Filariasis* Manson has been able to demonstrate a further occlusion of the lymph vessels by proliferation of the endothelium. The effect of mechanical blockage by adult *Filariae*, the fibrotic changes produced as a foreign body reaction in the glands, and the proliferation of the endothelium, all impede the return flow of lymph to the thoracic duct. The pressure in lymph channels increases and as a result, dilatation and varicosity of the lymphatics take place. There is temporary water-logging of the tissues drained by the affected group of lymphatic glands. Collateral circulation is established and the water-logging disappears. This process is repeated several times and due to increase in the obstruction to the lymphatic flow oedema of the part becomes permanent. Accumulation of fluid in the tissues causes irritation and brings about fibrosis. So that pitting oedema gives place to solid oedema. After sometime, as a result of inadequate nutrition colloid degeneration takes place giving rise to the familiar blubbery tissues. Due to obstruction of the lymph flow the varicose lymph vessels sometimes rupture giving rise to conditions like lymphorrhoea, chylous ascitis, and chyluria.

Lymphangitis is common in all forms of *Filarial* disease and is associated specially with enlarged groin glands, *Filarial* disease of the testes and spermatic cord, elephantiasis and lymph scrotum. These lymphangitic conditions are mostly non-bacterial and are allergic in nature as proved by Llyod and Chandra. In a few cases, however, secondary infection may be present.

*Age incidence*—It is true that elephantoid conditions are not met with in young children up to ages of 10 to 15 years. Various theories have been put forward to account for this. Absence of hyper-filarialisation small

calibre of the lymphatics, and non-development of the genitalia up to puberty, are factors thought to be responsible for the absence of Filarial affections in children. My experience, however, in the out-patient's clinics has been otherwise. Inflamed lymphatics, inflamed glands in the groin, and thickening of the spermatic cord are not uncommon sights. To my mind the lack of elephantoid conditions in the young is due to the richness in lymphatic flow and consequent compensatory phenomena. One has only to visualise the chubby arms and legs of a small child and compare it with the dry and shrunken limbs of age to realise the importance of the rich lymphatic flow.

*Clinical manifestations*—The clinical manifestations of Filarial affection that one meets in every day practice are either of the obstructive type or of the inflammatory type.

*Lymphangitis* is the commonest of all Filarial affections. It comes on in repeated attacks. Painful cord-like swellings of the lymphatics appear with red congested streaks in the subjacent skin, and inflammation of the lymphatic glands takes place. This may last for several days and may be accompanied by rigor, fever and vomiting. As Lloyd and Chandra have proved, there may be two factors responsible for this, namely—septic and toxic. In the septic type there is increased polymorphonuclear leucocytosis and in the toxic type there is eosinophilia.

*Treatment*—Treatment consists of rest and elevation of the affected part along with either cooling lotion or hot fomentation. In my experience a smart saline purge is all that is necessary to make the condition settle in a day or two.

A lady came to me with a swollen cord in her forearm and I put her on *mistura Alba*. Two days later she returned with hardly any improvement. On enquiry I found out that her bowels had not acted at all. Two ounces of saturated solution of mag sulph was given straight away and the swelling disappeared the next day.

*Abscesses*—Occasionally when the parent worm dies and becomes infected with the streptococcus or the staphylococcus an abscess forms, in which, fragments of *Filaria* are found. An incision and simple dressing cures the condition in a few days' time. In this connection I must draw the attention of the unwary to a condition which I have labelled "Pseudo-filarial abscess". A patient may present himself to a doctor with a foot or forearm which is red, hot, painful and swollen. A definite fluctuation is elicited. On incision, however, to the dismay of the surgeon, only serous or sero-sanguinous fluid comes out.

I was called to see a doctor with high temperature, headache and restlessness. His forearm was immensely swollen. On examination I could elicit definite fluctuation. Conservative line of treatment was adopted. The next day the temperature shot up again and fluctuation was even more definite. I decided to operate on him the following

noon but due to some reason or other I could not reach there before late in the evening. The operation had to be postponed. The following morning the temperature came down, the swelling of the forearm almost disappeared, and the patient was immensely better.

To my mind this group of pseudo-abscesses are caused by localised water-logging and as soon as the collaterals are opened up the swelling disappears. To save this discomfiture one should differentiate this condition carefully from true abscess and pus formation.

*Furunculitis*—We do come across occasionally, a condition which is known as furunculitis (Castellani). As the late Col Bird pointed out, it is a highly toxic condition in which streptococcal inflammation rapidly spreads upwards and downwards. If prompt surgical interference is not done it may end in death. How far the *Filaria* is responsible in initiating this condition has not been stabilised.

*Filarial Septicaemia*—This is not a recognised terminology at all, nor has it been used on any scientific basis. In Gaya we repeatedly come across a series of cases which is locally known as Filarial Septicaemia. The patient suddenly falls ill. His temperature shoots up to over 105 degrees and in a few hours the patient becomes unconscious. These cases usually end in death within 48 to 72 hours. On the second day a careful examination reveals a red patch on the skin of the abdomen, thigh or scrotum. Blood examination usually does not reveal the presence of *Micro-filariae* and the culture report is negative. Only a few cases respond to sulphonamide treatment but the majority end fatally and respond to no treatment at all. At the outset one begins to doubt whether he is dealing with a case of cerebral Malaria or frank streptococcal septicaemia. Malaria can be easily ruled out because of the absence of M.T. in the blood and of response to atabrin. That these cases may be of Filarial origin is suggested by the following considerations —

Gaya is a highly endemic area for Filariasis. These patients usually give a history of having suffered from Filariasis previously. Evidence of Filarial affection is usually present. Cases that come for treatment are far too many and conform to type. Even in larger centres one does not come across so many cases of streptococcal septicaemias. Streptococcal septicaemias on the other hand are amenable to serum therapy and sulphonamide medication, whereas these cases do not respond at all.

Considering the above facts although the *Micro-filaria* is not demonstrable in the blood at the time, one is forced to associate this condition with Filarial infection. I should like to know the opinion of my friends here, whether in other parts of India where *Filaria* is rampant, one comes across such cases.

Of the obstructive group, the elephantoid arms and legs make us feel particularly helpless. While discussing the pathology I have pointed out

that at first the affected limb shows pitting oedema—this oedema appears and disappears for a few months and later on gives place to solid oedema. It is in this pitting stage that we can do something. I shall revert to my favourite panacea—the saturated solution of magnesium sulphate. Smart saline purges for three or four consecutive days along with rest in bed will rid the limb of superfluous fluid. In my experience, a course of injections of arseno-typhoid, repeated every six months for a period of two years, apparently cures the condition. How this arseno-typhoid acts I am not clear about. But in practice I do find that it helps.

In this connection, you will allow me to narrate my personal experience as a sufferer from filariasis. Immediately after passing the matriculation examination, my left foot and left hand became swollen. All possible remedies were of no avail. In sheer dismay I approached a Hakim Saheb who gave me a dose of what I call gun-powder purgative. After the thirty-fifth motion I could not get out of my bed and the elephantoid condition of my foot and hand left me for good. My faith in saline purgatives as a remedy for filariasis is based on that experience, and I am happy to tell you that I have had good results in treating patients with pitting oedema of the limbs. If you take a careful history from patients suffering from acute attacks of Filariasis I am definite, that in 100% of the cases you will get a history of constipation immediately before the attack. I therefore conclude that there is some relationship between the working of our bowels and the Filarial attacks.

When solid oedema has taken place one does not know what to do. None of the operative procedures described so far has proved to be a success. Sampson Handley's lymphangioplasty although excellent in principle fails to achieve the desired result. Kondolean's operation affords relief no doubt, but the relief is short-lived and the limb resumes its original size.

One curious phenomenon in this connection may be noticed. When a Kondolean operation is performed in one leg, for some unknown reason, the other leg in some cases, starts swelling with increased vigour, till it attains huge dimensions. This particular experience one gets in dealing with hydrocele of filarial origin as well. A hydrocele has been present for years without any appreciable thickening of the skin, as soon as it is interfered with by radical operation, the skin of the scrotum starts thickening within a short period, so much so, that about 15 to 20 per cent of our cases in Behar return to us within a year's time with a scrotum much bigger in size than what it was originally. It is easy to appreciate the disappointment of the patient on account of his last operation. The reason for this curious phenomenon has yet to be found.

Ray's gluteal-femoral plastic operation I have no experience of. As Mr Ray is present here he will very kindly enlighten us on this subject.

*Scrotal tumours* and localised pedunculated masses in the limbs are the only conditions which are amenable to surgical interference

*Scrotal tumours*—For a successful issue the cases must be thoroughly prepared. The general health must be looked into. The skin of the tumour should be made as healthy as possible by a series of baths, massage and medication. Patients lose large quantities of body fluids during and after operation, therefore adequate fluid replacement must be ensured. The chief drawback of the operation is loss of blood. Various methods have been described to minimise this.

McLeyod's tourniquet method is unsound. The cut edges of the skin slip past the tourniquet and there is danger of injuring a hidden hernia. Connel's method of undermining the skin collar is not simple either. Andreasen's technique is simple and practical. By making a mid-line incision and dividing the scrotum in two halves, bleeding is reduced to its minimum, as the incision passes through a comparatively avascular zone. The important vessels may be ligatured beforehand. It affords an additional advantage in those cases where the patient has undergone previous operation for hydrocele, and the testes are as a result adherent to the surrounding tissues. By dividing the scrotum beforehand the testes can easily be freed under vision and kept on the abdomen till required again.

Connel's suggestion of stripping the cords of their fibrous covering and laying bare the perineal muscles, in order to establish a free lymphatic flow seems to be quite reasonable.

The practice of some surgeons in preserving the preputial flap for the future covering of the penis has no special merit. A few cases that I did by this method came back to me for oedema of the penile skin and had to be re-operated.

Thiersch's graft on the whole is quite satisfactory. It provides a fairly supple covering and there is no difficulty in the erection of the organ.

The ring ulcer at the root of the penis takes a little longer to heal but that is not a serious handicap. Patients can walk about with light dressings.

Complications after operation of scrotal tumour are sepsis, urinary fistula, and burying of the penis. Proper attention to the general health and to the skin of the tumour will minimise sepsis to a great extent. Should however, sepsis supervene, active sulphonamide treatment will put things right in a couple of days.

*Urinary fistula*—During the process of liberation of the penis it is not very difficult to damage the urethra and consequently urinary fistula results. It is always safer, especially for the beginners, to pass a metal or gumelastic

bougie in the urethra before liberating the penis. This helps in keeping at a respectful distance from the urethral canal.

Burying of the penis can easily be avoided if the root of the penis is anchored to the skin collar by a few stitches.

*Lymphorrhoea of scrotum*—Is commonly met with. The patient usually gets recurrent attacks of fever due to streptococcal infection. The best treatment is to remove the affected segment of the skin.

*Chyluria*—This is a particularly annoying condition. As Ray has pointed out chyluria may be either of renal origin or of vesical origin. Rest in bed, limitation of fat and fluid in diet, and irrigation of bladder with boracic lotion improves the condition.

Administration of methylene blue by mouth or injection of trypaflavin is sometimes found to be useful.

*A word about prevention*—Till such times as we are in possession of a specific the following suggestions may be useful. An extensive mosquito campaign, regular use of mosquito curtains, and treatment of known carriers with periodical injections of trypaflavin.

## DISCUSSION

Dr K N Misra agreed with the Opener about the complications of Filariasis. He considered that acute funiculitis was due to an associated Streptococcal infection and has had good results in such cases with Sulphonamide. He has also met with acute inflammatory swellings simulating abscesses and has treated them with incision and Sulphonamide. He considered that the filarial toxin devitalised the tissues and prepared the ground for Streptococcal infection. This, in his opinion, was the cause of Filarial Septicaemia. In Filarial lymphangitis he has tried Novarsenobillon, Neostibosan and urea-stibamine. He has found novarsenobillon giving the best results and he repeats the course after two years. Regarding the operative technique, he did not think Andreason's method of operating through the median-raphe had any special advantage. Chances of leaving behind Filarial tissue was also greater. He preferred the Standard technique. Sulphonamide, he considered of value in preventing post-operative infection.

Lt-Col K G Pandalar said that Septicaemic manifestations of Filariasis occurred frequently in certain places in Southern India and in many cases ended fatally. His experience of Filarial conditions was mostly in their chronic stage, but even such cases were prone to get acute attacks. He wished to hear the experience of others regarding the interval during which a patient should be free from such acute symptoms as fever, local redness and pain before the patient could be considered in a safe condition for operative procedure. His own rule was to allow a quiet interval of about six months during which treatment was carried out. He treated them with intra-venous injection of neutral iodine and repeated the course after three months. He pointed out the necessity of pre-operative treatment since some cases who had been free of symptoms developed acute symptoms during the post-operative period, and drew attention to a type of case not

mentioned by the Opener, in which there was generalised subcutaneous thickening with subcutaneous nodules scattered in various parts of the body. Removal of Elephantoid Scrotal masses in such cases is almost always followed by recurrence.

Continuing Col Pandalai referred to points in the technique of the operation for Scrotal tumour. He did not find any special points in favour of Andreason's method and considered the standard technique good enough as with a plentiful supply of haemostatic clamps the operation could be completed under one hour. To prevent the testes slipping up into the groin after operation, he sometimes anchors them to the lining of the new Scrotum with a catgut stitch.

The Tunica Vaginalis in some of his cases contained chyle and microfilariae have been demonstrated in the fluid. He referred to the occasional difficulty of everting the sacs in these cases necessitating their excision. He has had a case of Chyluria of Renal origin in which chyle was seen to be discharged from the ureteric orifice on Cystoscopic examination.

The Kondoleon operation in his experience gave very disappointing results.

Dr H Hyder Ali Khan wished to be enlightened on the Geographical Distribution of Filariasis in India and its incidence in Bihar and Orissa. He said it was endemic in East Africa and Zanzibar. Cases in Southern India, Ceylon and Bombay, he thought, were exported from outside. He referred to the difficulty he has had in dealing with the testes and the penis and wished to know if castration was ever found necessary.

Dr S R Moolgavkar said that the lower extremity and the Scrotum were more commonly affected in Filariasis though he has seen a few cases affecting the upper extremities and the breasts. He considered that operation was not helpful in Solid Filariasis of the legs. He has obtained good results with the Kondoleon Operation when done early while the oedema still pitted on pressure.

In Filariasis of the Scrotum he has noticed that the skin near the perineum and that lining the preputial sac always remained thin and thought that this was due to a difference in the lymphatic drainage. He buries the testes in pockets prepared in the thighs and has had no complaints of any discomfort on account of this. He does not graft the penis at the first operation, but leaves it in a subcutaneous tunnel with a catheter tied in for about ten to twelve days at the end of which he does what he calls the "Resurrection operation" and grafts the penis.

Dr P. Chatterjee discussed the two main aspects of Filariasis, viz, (1) The inflammatory and infective conditions and (2) the fibrotic changes consequent on filarial infection. Acute Funiculitis, he said, has been mistaken for Strangulated Hernia, and the mistake could be avoided if attention was paid to the early high rise of temperature with rigors and the previous history. He considered operation dangerous in acute funiculitis as there was a risk of Septicaemia and for the same reason did not interfere with acute lymphangitis. Sulphanilamides have been found helpful.

He drew attention to the loose manner in which the term "Filarial Septicaemia" has been used and pointed out the difficulty of proving whether these cases were due to Filarial toxæmia or to secondary pyogenic infection. He referred to cases of acute filariasis simulating acute appendicitis. These were cases of inflammation of the retro-peritoneal lymphatics. The onset of pain and rise of temperature before the abdominal pain and inflammation of the Cord and testes if present, should, he said, suggest the condition. He did not agree with Dr Sinha that there was a marked Eosinophilia in the blood in acute conditions but has noticed a polymorphonuclear increase. He pre-

ferred organic preparations of arsenic to Aisen typhoid infections. He described his technique for removal of a scrotal tumour which was on the lines of the standard operation.

Dr R N Cooper did not agree with the remarks made by Dr Moolgavkar about the mucosa of the prepuce. He referred to a rare case of filariasis affecting the scalp which recurred after removal. He has obtained a history of Chyluria in some cases of Filariasis and has seen one case of haematuria of filarial origin in a patient who gave no history of filarial attacks. He thought that Filariasis was rampant where palm trees abounded.

Dr A V Baliga gave his experiences of the different manifestations of Filariasis. In acute funiculitis, blood examination often revealed microfilaria and he treated the condition by conservative measures. Two cases simulating acute appendicitis were seen and in one, the operation that was advised was abandoned on the discovery of microfilariae in the blood. He described cases of lymphangioma of the inguinal region, of chylous hydrocele and of nodules in the Cord in all of which, with few exceptions, microfilariae were demonstrated in the blood. In two cases with haematuria though stones were found in the kidneys, he was not sure if the haematuria was not due to the filarial infection.

In operation for Scrotal Tumour he has always found the skin of the postero-lateral aspect to be fairly thin and has made use of this in accommodating the testes in the Scrotum. He has not found the skin of the prepuce sufficient to cover the penis and always grafted the penis at the time of removal of the Elephantoid Scrotum.

Dr S C Ghosh discussed the operation for scrotal tumour. He used diathermy when available, for arrest of haemorrhage. He placed the testes in the thighs and emphasised the need for draining the wound.

Dr U P Sinha briefly replied to the various points raised in the course of the discussion.

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# ANAESTHESIA FOR UPPER ABDOMINAL SURGERY

BY

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AND

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If anything baffles an Anaesthetist, it is to administer an anaesthetic for an upper abdominal procedure. The Surgeon seeks the fulfilment of the following conditions as far as may be expedient (i) complete muscular relaxation, (ii) minimal respiratory movement, (iii) contracted viscera and (iv) complete parietal peritoneal flaccidity. Such conditions may be provided comparatively easily for lower quadrant operations, with more difficulty for mid-abdominal sections, and with most difficulty for procedures in the upper abdomen. Moreover, abdominal operations, especially in the upper region, give rise to a greater proportion of post-operative pulmonary complications than do operations in other parts of the body. In order to provide the Surgeon with the best working conditions and to decrease the post-operative complications to a minimum, it is essential that the anaesthetic agent or combination of agents and the method of administration be properly chosen for each individual case.

*Preparation of patient for administration of anaesthetic*—Every anaesthetist should examine the patient himself before the day of operation and evaluate the "Physical State"<sup>1</sup> of the patient which will influence the pre-anaesthetic medication, the choice of the anaesthetic, and the method of administration. In order to have a smooth induction of anaesthesia, pre-anaesthetic medication is essential. The factors which influence the pre-anaesthetic medication are age, sex, height, weight, pain, emotion, fever, and thyroid activity. The pre-anaesthetic medication used in our clinic has been as follows—on the morning of operation a dose of barbiturate (i.e. nembutal gr ss to gr i) is given two hours before operation followed half an hour later by an injection of morphine and hyoscine in the ratio of 25 to 1 (e.g. morphine  $\frac{1}{4}$  and hyoscine gr  $\frac{1}{100}$ ), the actual dose of morphine and hyoscine depending on the above factors. Hyoscine is not used in children and the aged. For babies below 1 year, no pre-medication is given and for children above 1 year, an injection of morphine and atropine is given in proportionately minute doses.

*Choice of anaesthetic agent and method of administration* Ether—Ether, administered by open, semi-open, or closed methods, is well tolerated

by the average patient and is a most reliable agent for production of relaxation. A patent airway is essential for good anaesthesia, relaxation and quiet breathing and this can be attained by intratracheal intubation<sup>2</sup> and by the use of the carbon dioxide absorption technique of Waters<sup>3</sup>. By this method the depth of anaesthesia can be well controlled with a minimum quantity of anaesthetic agent and thus post-operative recovery from the effects of anaesthetic agents is hastened.

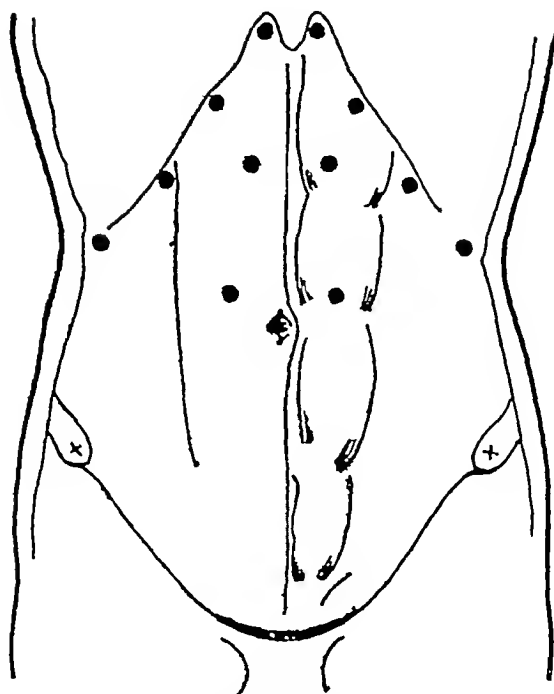
*Chloroform*—Lundy, of the Mayo Clinic, groups chloroform or any mixture with chloroform among the agents to be avoided for operations on the stomach and duodenum, because of its immediate and remote untoward effects<sup>4</sup>. Personally, I have no experience with chloroform anaesthesia.

*Nitrous oxide*—Nitrous oxide with oxygen alone is absolutely unsatisfactory but with a minimum quantity of ether added to it, relaxation and quiet breathing can be produced with safety provided an intra-tracheal method with carbon dioxide absorption technique is used.

*Cyclopropane*<sup>5</sup>—Cyclopropane is probably one of the most difficult anaesthetic agents to administer with success but as this agent can be used with a much higher percentage of oxygen, it is very useful in certain cases when administered with an abdominal block.

*Local Anaesthesia*—Certain operations in the upper abdomen may be carried out under local anaesthesia either infiltrating the line of incision in the abdominal wall or by using field block of the abdominal wall. Local anaesthesia supplemented by light gas—oxygen—ether or cyclopropane anaesthesia will give the most general satisfaction both during and after operation. This is called by Lundy "balanced anaesthesia"<sup>6</sup>. If it is essential that inhalation anaesthesia be avoided, abdominal block combined with anterior splanchnic block (Braun's method)<sup>7</sup> may be employed. After the abdominal incision is made, the hand is introduced and the aorta gently retracted with the finger. About 70 c.c. of 0.5 per cent solution of novocaine is then injected in close contact with the lateral aspects of the body of the first lumbar vertebra.

*Abdominal Field Block*<sup>8</sup>—With the patient lying in the supine position, skin wheals are raised one on either side of the xyphoid process and then at intervals of 60 mm. along the costal margins on both sides. Two skin wheals are also raised on both sides of the mid-line on the rectus sheath mid-way between the xyphoid process and the umbilicus and the last two, one on each side on the rectus sheath, a little higher than the umbilicus (Fig. I). A 8 cm. or 10 cm. needle attached to the 10 c.c. syringe filled with 0.5 per cent novocaine solution, is passed through each of the skin wheals in turn and advanced in a direction perpendicular to the surface of the skin, until its point reaches the muscle layer beneath the deep fascia, where the



Abdominal Field Block—The black dots show the site of injections

solution is distributed. Not more than 150 c c of the 0.5 per cent solution is necessary for these injections. All our abdominal field blocks have been done by using 0.5 per cent solution of intracaine<sup>9</sup> with adrenaline 1 in 200,000 (1 c c of 1 in 1,000 adrenaline in 200 c c of 0.5 per cent solution of intracaine).

*Spinal Anaesthesia*—High spinal anaesthesia may be used for upper abdominal operations, but it is not always satisfactory. High spinal involves a great strain on the circulatory system of the patient and sometimes retching and vomiting interferes with surgery. In some cases, when the operation is prolonged, a safe dose of spinal anaesthetic may not maintain relaxation until the operation is completed. In such cases, a general anaesthetic is often resorted to with increased danger of post-operative pulmonary complications.

Many patients under spinal or local anaesthesia find it a severe emotional strain to remain conscious during operation and suffer considerable discomfort from the abdominal manipulation involved, even though the analgesia be perfect. A procedure that has been proved to increase the safety and satisfaction of spinal anaesthesia is to intentionally supplement<sup>10</sup> the spinal with a light plane of intravenous anaesthesia. This combination permits the use of a smaller dose of the spinal anaesthetic agent, the maintenance of a safer, that is, a lower level of analgesia, and at the same time eli-

minates the objection of the patient being awake during the operation. Likewise local anaesthesia can be supplemented with a light plane of intravenous anaesthesia, if required.

The most recent development in spinal anaesthesia has been the introduction of a method of fractional or continuous<sup>11</sup> spinal anaesthesia. This method is still on trial.

Table I

No of cases	Operative Procedure	Inhalation Anaesthesia	Local anaesthesia (abd field block)	Intubation with CO <sub>2</sub> absorption technique	Post-operative complications
8	Partial Gastric Resection	N <sub>2</sub> O O <sub>2</sub> -Ether	Yes	Yes	2 Pneumonia (recovered)
1	Wedge resection of gastric ulcer	Do	Yes	Yes	Pneumonia (expired)
2	Exp laparotomy (ca stomach—inoperable)	Do	Yes	Yes	Nil
1	Gastro enterostomy	Do	Nil	Yes	Collapse lung (recovered)
1	Exp laparotomy (ca stomach—inoperable)	Cyclopropane-oxygen	Yes	Yes	Nil
1	Exp laparotomy & Jiannu Gastrostomy	Do	Yes	Yes	Nil
1	Exp laparotomy & Janeway Gastrostomy	Do	Nil	Yes	Nil
1	Partial gastric resection	Do	Yes	Yes	Nil
1	Exp laparotomy with marsupialization of pancreatic cyst	Do	Yes	Yes	Nil
1	Partial gastric resection plus Rankin resection of transverse colon	Nil	Yes	Nil	Mild wound infection
1	Gastro enterostomy	Nil	Yes	Nil	Nil
1	Gastro enterostomy with Devine exclusion	Nil	Yes	Nil	Inanition from leakage from stoma through the wound (expired)

**TATA MEMORIAL HOSPITAL**  
**ANESTHESIA RECORD**

No. 726 Date 4 8 41  
Ward 1<sup>st</sup> Floor  
Name Mrs P Age 53 Time 9<sup>00</sup> AM O R I  
Op. Dr. no. ed Gastric Resection Sur. con. Pool  
Anes. Hist. (Neg) S U  
Premedication Nemb gr ss at 7<sup>00</sup> AM, Morph  $\frac{1}{8}$  Allop fr  $\frac{1}{200}$  at 7<sup>30</sup> AM

8 AM 15 30 45 9 15 30 45 10 15 30 45 11

CO<sub>2</sub> H<sub>2</sub> NO ETHER Others  
QV O<sub>2</sub> CC/MIN  
PLANE OF ANESTHESIA  
150 160 140 120 100 80 60 40 20 0  
PULSE  
RESPIRATION  
SYSTOLIC B.P.  
DIASTOLIC B.P.  
START OF ANESTHESIA  
START OF SURGERY  
END OF SURGERY  
POSITION  
Supine

INDUCTION  
Exc. N.E. Cough...  
Laryngospasm...  
Sat Others...

MAINTENANCE  
I abd field block  
E Intubacane  $\frac{1}{2}$  /  
II Oro tracheal Intubation  
III Traction on stomach

REMARKS  
I X II III

Agents Ind. N<sub>2</sub>O - O<sub>2</sub> - Ether Maint. Ether - O<sub>2</sub> RECOVERY  
Tech Ind. Absorption Maint. Oro tracheal - Abs Reflex In O.R. Yes ☒ No...  
Operation Partial Gastric Resection Vomit...  
Surgeons Pool - Meher Homji - Torne Exit...  
Anesthetists Sircar Others...

Table II—Anaesthesia chart showing patient's condition during operation

(From the Surgical Services of Drs POOL and COHN, Surgeons,  
Tata Memorial Hospital, Parel, Bombay, 12)

*Intravenous Anaesthesia (Barbiturate)*—It is well to limit its use to supplement local or spinal anaesthesia

*Tri-brom-ethanol (Avertin)*<sup>12</sup>—This should be used as a basal hypnotic only and should never be used to produce anaesthesia by itself

Thus the various anaesthetic agents and methods of administration have been reviewed. Each particular method has merit in the hands of the anaesthetist who is familiar with it. Table I, P 19 shows the anaesthetic agents and techniques used in a consecutive series of 20 cases of upper abdominal surgical procedures in our clinic.

From the same Table we see that out of 20 upper abdominal procedures, 17 cases were done with inhalation anaesthesia through intratracheal method with carbon dioxide absorption technique, 15 of these cases were combined with abdominal field block. Three cases were done entirely under local anaesthesia as their general condition did not permit the use of any inhalation anaesthesia. Spinal anaesthesia was not used for any single case. Operative mortality was 10 per cent. One patient died of pneumonia and the other from inanition from leakage from the stoma through the wound.

*Complications during surgical procedures*—Buist<sup>em</sup> and Rovenstine<sup>13</sup> have described a reflex complicating anaesthesia during abdominal surgery. They describe that disturbances of a reflex nature, characterized by abdominal rigidity, jerky respiration, and a marked reduction of the pulse pressure may be caused by visceral manipulations during surgical intervention in the upper abdomen.

In our series we had such an experience on two occasions, the relaxed abdomen suddenly became rigid, respirations became jerky and there was a marked reduction of pulse pressure which coincided with traction on the stomach after it had been divided at the pyloric end.

Factors which seem to intensify the disturbance resulting from manipulation of viscera in the neighbourhood of the coeliac ganglion are the placing of a sand bag under the lumbar region of the patient, "breaking the table" so as to extend the epigastric region, excessive pressure upon deep retractors and the use of numerous packs in the abdomen, when this reflex occurs during operation, it is recommended that visceral manipulations be curtailed as much as possible and if this is insufficient, the administration of physostigmine may be beneficial.

Another most important complication in an anaesthetised patient is the regurgitation of gastric contents into the oropharynx during manipulation of the stomach. Aspiration into the trachea and bronchus can be prevented by pre-operative emptying of the stomach, intra-tracheal intubation if inhalation anaesthesia is used, and the use of a stomach-tube during sur-

gery, so that the stomach can be emptied whenever necessary. A stomach tube was introduced in all our gastric cases (operated upon with inhalation anaesthesia) after the intra-tracheal intubation was done. The stomach tube was left in place after the operation for constant drainage.

*Post-operative pulmonary complications*<sup>14</sup>—The incidence of post-operative pulmonary complications is notoriously high in upper abdominal surgery, irrespective of the type of anaesthetic used. The management of the patient in the post-anaesthetic period is most important in the avoidance of post-operative pulmonary complications. Respiratory obstruction must be avoided until the reflexes have returned sufficiently to safeguard the patient from asphyxia or from inhalation of foreign material. A depressed patient must not be allowed to lie in one position for any length of time. Frequent change of posture is necessary for adequate ventilation of all parts of the lungs.

Certain complications are due to the collection of viscid secretion or foreign material in the tracheo-bronchial tree. Such patients should be encouraged to cough and it can be made effective by change of position and simultaneous manual support of the abdominal wall. Finally the tracheo-bronchial tree can be cleaned, if necessary, by suction applied directly by means of a small catheter passed through an intra-tracheal tube. In the conscious patient, the base of the tongue and larynx must first be anaesthetized with a fine spray of cocaine before intra-tracheal intubation is attempted.

### Summary and Comment

In this paper a review has been made of the various anaesthetic agents and techniques used for anaesthesia in the surgical procedures involving the upper abdominal region. Each particular method has merit in the hands of the anaesthetist who is familiar with it. In our series 85% of the cases were done with "balanced anaesthesia" with quite satisfactory result.

Although any method of anaesthesia is not advocated as a routine, still, if one method is to be used, "balanced anaesthesia" will give the most general satisfaction, both during and after operation.

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# SOME UNUSUAL DEVELOPMENTAL ANOMALIES IN THE HIND END OF THE BODY\*

BY

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## Introduction

The case, which is herein described, presents such unusual anomalies of development of the hind end of the body which are difficult of explanation from the known facts of the embryology of this region that we feel that it is worth recording

## Clinical Notes

The body of a 'male' child, a week old, was sent by Dr K S Captain, M D (Lond), the Medical Officer of the Cheluvamba Hospital for women and children, Mysore, with a note that it presented certain peculiarities of development in the perineum. The child was born of a multipara. The previous children were all normal. This child was well developed and was born full term. It lived for a week. The doctors noticed that the child passed faeces through the urethral opening at the tip of the 'penis' and they were not sure of the way in which the urine was voided though the linen was wet.

## Dissection Findings

The body was of a full term foetus but emaciated. Its weight was 5 lbs. It presented certain peculiarities in the perineum. Otherwise it was quite normal. The perineum presented the appearance of a hermaphrodite with the absence of an anal opening. On closer examination of the region, we found a normally developed penis with an opening at the tip which was assumed to be the opening of the penile urethra. There were two swellings with rugosity of the skin just posterior to the penis. These were assumed to be the scrotum. But on palpation, we did not feel any glandular structure like the testis but there were several sinuses through which extruded caseous material on pressure. Just behind these swellings there was a reddish epithelial-like raw surface flanked by cox-comb like swellings which looked like the labia minora. Posterior to this area in the perineum was a depres-

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\* The case was demonstrated at the Annual Conference of the Mysore Medical Association 1940 and a short paper was read at the Baroda session of the Indian Science Congress 1942

sion which was a blind pit and we think that it was the anal pit which did not communicate with the rectum (Fig 1)

'Penis' into  
which the hind-  
gut opens

Pseudoscrotum  
no gonads inside



Cox-  
comb  
like folds  
of moist  
skin sug-  
gesting  
labia  
minora

Raw moist  
epithelial sur-  
face into  
which open  
the ureters  
and Mullerian  
ducts

Fig 1 Photo of the external features of the perineum

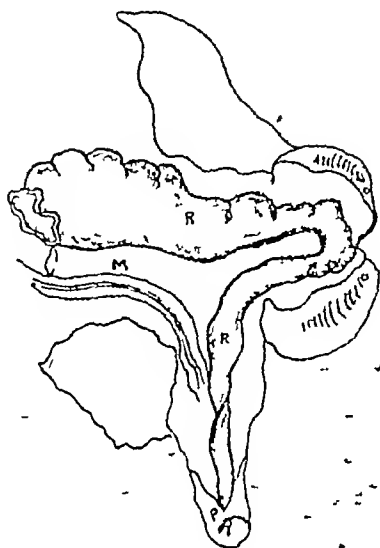


Fig 2 Shows the gut passing into the left pouch and then becoming continuous as the 'penile urethra'

On dissection, we found that there was no symphysis pubis. The 'penis' did not have the usual structure, viz, the three cylinders of cavernous tissue. Under the skin and fascia there was a single tube which was not cavernous in nature and on tracing it backwards, it enlarged into a diverticulum which was lodged in the left pouch. This pouch was lined by a glistening epithelium which was continuous with the general peritoneal cavity. Therefore we presume this to be a processus vaginalis. From this the tube continued into the general abdominal cavity as the hindgut (Fig 2). The gut showed no differentiation into large and small intestines. So this tube was the gut which had taken an abnormal course. Instead of ending in the pelvis as the anal canal, the hindgut was ventral to the structures like the Mullerian ducts and became the 'penile urethra'.

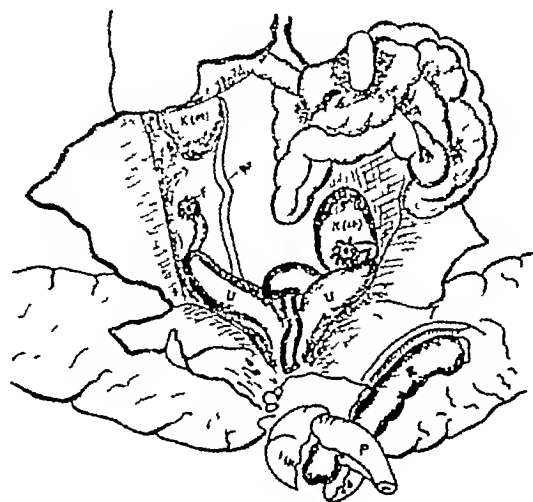
On dissecting the scrotal swellings, we found that there was an opening of a duct in each swelling which, when traced by gross dissection and by injection of coloured fluids, turned out to be the ureters. The urinary bladder was absent.

On separating the gut from its bed by cutting through its mesentery we found a single duct running in the middle line. Distally it opened on the raw epithelial surface. The lumen was being formed by breaking down

of a septum as if two ducts had united to give rise to this median blind tube. The lumen was full of cheesy material. This tube when traced proximally was seen to pass into the pelvis and there dilated into a blind sac as in the diagram (Fig 3). This sac was seen to be connected by a sort of mesentery to the posterior abdominal wall. It was first thought to be the



Fig 2A Is the photo of the actual conditions in the abdomen, and Fig 3 is the line drawing made of it showing the essential features



K—Kidney UR—Ureter F—Fallopian tube,  
U—Uterus R—Hindgut P—Penis  
M—Mesentery

Fig 3 Shows deeper dissection after removal of the gut. Note the median tube with the dilated cranial end and the 'double lumen'

uterus and the vagina, but further dissection showed this was not so. Histological examination also showed this tube to be large intestine. There was no proper differentiation of the perineum into the usual fascial compartments and the muscles. The kidneys were lobulated. The right one was in the abdominal cavity as usual, whereas, the left one was low in the pelvis (Fig 3).

There were two elongated solid bodies whose cranial ends were narrow, tubular and fimbriated. On sectioning, these solid masses were found to be thick walled tubes and histological examination of the same revealed smooth muscle fibres arranged in concentric layers. So we interpret these two muscular tubes as the two Mullerian ducts which have differentiated proximally into the two fallopian tubes with the fimbriated ends, but distally failed to unite to form the uterus and the vagina. They remained as primordia of double uteri. The two masses approached each other caudally but failed to unite. Distally they were lost in the general connective tissue and their cavities ended blindly (Figs 3 and 4).

Attached to the fimbriated ends through a mesentery there were two oval bodies  $\frac{1}{2}$ " long on the posteromedian side. These, from the nature of

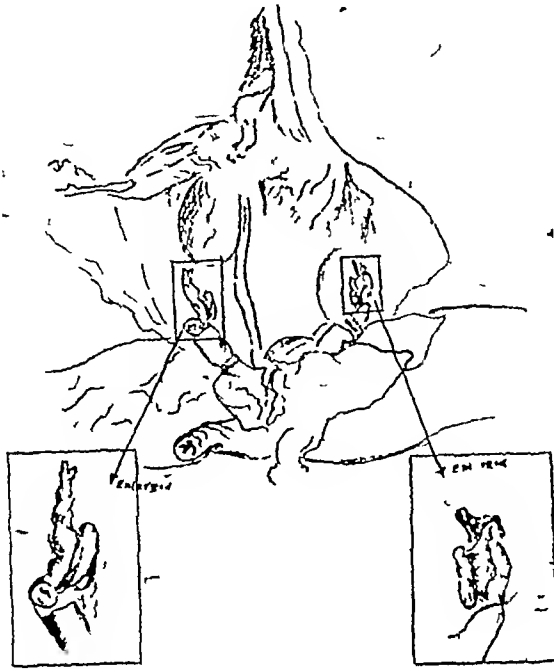


Fig 4 Drawing of dorsal structures showing gonads (in the insets) and the cut portions of the various structures removed for examination

their attachments, looked to be gonads (Figs 3 and 4). Microscopical examination of bits of these bodies showed embryonic ovarian tissue. Both were similar in structure. Full serial sectioning will have to be done to say whether these bodies are purely ovaries or ovotestes.

There were no abnormalities in the other systems.

Summarising, the various abnormalities are —

- 1 Absence of the symphysis pubis
- 2 Absence of the bladder
- 3 Failure of union of the Mullerian ducts to form the uterus and the vagina. There are two uteri.
- 4 Kidneys are situated at different levels, the left being in the pelvis.
- 5 The ureters open into the scrotal sac and then into the raw epithelial surface on the perineum.
- 6 The hindgut has no pelvic part. On the other hand it passes into the scrotal sac and into the shaft of the penis. No

differentiation of the gut into small and large intestines. No rotation of gut is seen with fixation of the mesentery as in normal foetuses.

- 7 The penis-like structure must be interpreted as the hypertrophied clitoris because of the nature of the gonads.
- 8 No remnants of the Wolffian ducts were found even after careful search.

### Discussion

From the above description, it is seen that this case is quite rare in as much as no similar series of abnormalities have been recorded before, though our search is by no means complete. This raises many questions regarding the development of the hind end of the body, specially about the development and fate of the cloaca. Keith<sup>1</sup> has discussed some of the common defects in the region of the cloaca but this type has not been mentioned by him.

Here we have to briefly describe the development of the cloaca. The cloaca—the entodermal cloaca to use the full terminology—is the blind posterior dilated part of the hindgut into which open successively the allantois, the Wolffian and Mullerian ducts and lastly the ureters. This common receptacle is later divided into a ventral urogenital sinus and a dorsal rectum. The division takes place in such a manner that the hindgut alone opens to the dorsal part and the rest of the ducts open into the urogenital sinus. There is no uniformity of opinion as to the manner by which this division is effected.

Most authors agree with Felix<sup>2</sup> who first described that the division 'takes place by the saddle between the cloacal opening of the intestine and that of the allantois growing as a partition downwards from above into the lumen of the cloaca, parallel to its dorsal wall, this partition is termed the septum urorectale'. Fraser<sup>3</sup>, believes, rather, revives, the older view of Rathke<sup>4</sup>, with modifications, that the division is due to two bilateral mesodermal folds pressing into the lumen, thereby pinching off the dorsal part from the ventral sinus part. "Mesoderm which was first in its (cloaca's) lateral aspect presses on it more from dorso-lateral and cranial side and here begins the formation of a dividing septum". For him, moreover this lateral mesodermal fold is nothing other than the genital cord in which are running the Wolffian and the Mullerian ducts before they enter the cloaca. This view is not shared by others. Most others believe that the two structures—the urorectal septum, and the genital cord, are quite different. Anyway the essential point, according to Felix and Fraser, is that a septum grows in, to divide the cloaca. It may be by union of two lateral folds (Fraser) or by a median saddle-like septum growing from before backwards (Felix).

The other school is represented by Keith and Wood Jones. For them, the division of the cloaca is a result of differential growth of the ventral and dorsal parts. "The ventral part of the chamber with the Wolffian ducts attached thereto, expands forwards, while the opening of the gut is shifted backwards to the caudal part of the wall." Keith believes that the embryonic rectum migrates actively backwards. 'The appearance presented by the backward migration of the rectal orifice is exactly the same as if the cloaca had been divided into the rectal and urogenital cavities by the septum marked 'a' in Fig 446 B & C.' For Wood Jones it is not a sliding process but the appearance of the 'septum' is comparable to the development of the interventricular septum of the heart. The 'uro-rectal septum' is first produced inferiorly by the downward growths of the ventral and dorsal parts of the cloaca. Between the ventral and dorsal downward growths, part of the original wall is left in its place and this projects into the cavity from below as the septum. It means that the communication between the two parts is at the cranial end of the cloaca and it is there, at the cranial end, that abnormal openings persist. This is quite opposed to the view of Felix and most authors, who believe that the communication between the rectum and the sinus is always near the cloacal membrane and that it will be obliterated by the fusion of the urorectal septum and the membrane inferiorly.

There is no difference of opinion regarding the further changes in the cloaca. After the two chambers are separated, each opens to the exterior by the breaking down of the anal and uro-genital membranes. The uro-rectal septum appears in the 5 mm embryo and the anal and uro-genital openings are established in 13 and 18 mm embryos, the anal opening being established later than the sinus opening.

In the female this stage is the permanent condition. The upper part of the sinus becomes the bladder and lower part the short female urethra and this opens on the perineum in the pudendal cleft which is the persisting embryonic ectodermal cloaca. In the male there is a further change in this region as a result of which the caudal part of the sinus with the ectodermal cloaca invades the genital tubercle (penis) and forms the male urethra. The ectodermal cloaca is closed up by the union of its lateral boundaries, *viz*, the genital swellings and the genital folds. In the female these remain separate and form the labia majora and minora respectively. In the male, the union takes place from *behind forwards* and thus forms the scrotum and the penis and the bulb of the urethra. The median perineal raphe is the line of fusion. The last part to unite is the end of the penile urethra and hence we get various degrees of failure of fusion of these swellings and folds—from the minimum deformity of hypospadias to the extreme condition of extroversion of the cloaca.

The Wolffian and the Mullerian ducts shift ventrally and open into the sinus part when the cloaca is divided. It is said that the 'uro-rectal' sep-

tum develops earlier than the fusion and differentiation of the Mullerian ducts to form the uterus and the vagina and hence, as said before, the genital cord in which these differentiate is not the same as the septum. The relative positions of the openings of the hindgut, the Wolffian and the Mullerian ducts change as the cloaca and the hind end of the body grow, and according to Keith, one can trace the evolutionary stages in the development and differentiation of the cloaca in man. He goes so far as to say that all developmental anomalies can be explained as arrests in this evolutionary process. He differentiates five stages, the amphibian, the reptilian, the monotreme, the marsupial and the mammalian stages (Fig 5 modified from

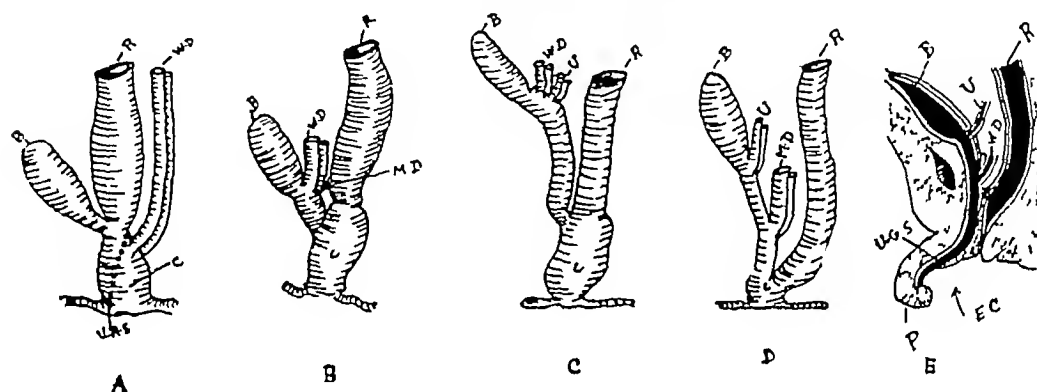


Fig 5 (Modified from Keith) Shows the evolutionary stages in the development of the cloaca. The dotted line in 5-A is the line of uro-rectal septum in the case. A-amphibian, B-reptilian, C-monotreme, D-marsupial, E-human. Abbreviations —B-bladder, C-entodermal cloaca, E C-ectodermal cloaca, M D-Mullerian duct, P-genital tubercle, R-rectum, U G S-urogenital sinus, U R S-urorectal septum.

Keith) The most important change is the shifting of the rectum to the dorsal and caudal position. In the amphibians, the rectal opening is cranial and ventral to the openings of the ducts. Gradually in the higher vertebrates the positions are reversed.

Some attempt is herein made to explain the abnormalities of the present case in the light of the above known facts of development of the various structures in the hind end of the body.

This case lends more support to the first view of a septum dividing the cloaca. For, if it were a case of non-migration of the hind-gut, it should have opened into a common cloaca with the genital ducts. But here there is no cloaca. The gut tube becomes continuous with the ventral part of cloaca which has grown forward and with the external cloaca, canalised the genital tubercle. The ureters and genital ducts open dorsally in the external cloaca, which is of the female type. We interpret this condition as a persisting amphibian stage in which the uro-rectal septum developed behind the opening of the gut and in front of the openings of the Wolffian ducts as shown by the dotted line in Fig 5-A.

Secondly the absence of the bladder and the microscopic structure of the 'penile' part of the tube show that the uro-genital sinus never differentiated to bladder, but retained the structure of the gut. The proper differentiation of the external uro-genital apparatus depends on the growth process, and, any derangement, either of endocrine origin or, even earlier, of 'growth organisers' of Speeman, produces a series of abnormalities as experimental embryology has shown. So we are of the opinion that very early in the intra-uterine development some specific factor failed to develop which produces the normal differentiation of the cloaca and other associated structures in the caudal end of this foetus.

The closure of the perineal cleft in this case is quite contrary to all accepted views and it raises doubts about the formation of the raphe from behind forwards in all cases, for here the anterior half is closed and the posterior half is still open.

Lastly the presence of the blind sac and tube in the mid-dorsal plane, which has the structure of the large intestine, is very difficult of explanation. It cannot be anal canal derived from the ectodermal anal pit, for the structure is not stratified epithelium but columnar and glandular. Can it be that this is the distal part of the gut opening into the cloaca, which became detached in intra-uterine life, and the proximal part of the gut opened into the 'penile part'? At any rate its explanation offers the greatest difficulty. We are conscious that the above interpretation of ours is not wholly satisfactory or complete. We have presented this case more for inviting explanations and to show that our present day knowledge of the development of this region of the body is neither adequate nor complete.

We take this opportunity of thanking our colleagues, Professor Hiriyannaiya of the Department of Physiology and Professor Naidu of the Pathology Department for their valuable help. We also thank Dr. Captain for sending us the specimen for investigation.

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# EXCISION OF THE RECTUM THROUGH THE VAGINA WITH THE PRESERVATION OF THE ANAL SPHINCTER

BY

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Excision of the rectum is indicated especially in two conditions, *viz* , carcinoma and fibrous stricture (tubular in nature), caused by lymphogranuloma inguinale. Removal of the rectum in a fairly early case of carcinoma gives encouraging results. About lymphogranuloma-inguinale there is a difference of opinion. It is generally believed that as the pathological changes in this disease primarily start in the lymphatics and other perirectal tissues and then involve the rectum, complete eradication of the lesion by removal of the rectum, is not possible and recurrence follows. Thus a permanent colostomy is advised as the operation of choice.

Carcinoma of the rectum is fairly common in the female, although a little less common in them than in the males in the proportion of 43 to 75 according to Williams. Benign tumours of the rectum are potentially malignant, as sooner or later they are transformed into frankly malignant growths. Many of the cases of early carcinoma of the lower rectum are admitted as cases of haemorrhoids.

In women, regardless of age rectal symptoms should call for a digital or proctoscopic examination and a biopsy should be promptly done.

Fibrous stricture of the rectum due to Lymphogranuloma Inguinale is not an uncommon disease and may give rise to a ringlike fibrous stricture or a thick cartilaginous tubular stricture. Many of these cases were formerly supposed to be syphilitic in nature, but now the etiological factor in many of these cases has been found to be Lymphogranuloma Inguinale. Many of these cases give a very long history of the lesion before serious symptoms of obstruction occur. In nearly every case, history of an inguinal bubo, which subsides without any suppurative complications is present. This lesion is much more common in the males than in the females. So far I have come across only two female cases suffering from the lesion, while the number of males that were found to suffer from this is well over fifteen.

The operation to be described below, is only applicable to cancer of the rectum in females. It is ideal where the growth is in the lower rectum or ampulla, and the upper end of the rectum, provided it is not too far advanced.

### Technique of the Operation (Vide Fig 6 & 7)

The anal sphincter is thoroughly dilated and rectum packed with gauze and the anus closed with sutures. The technique followed is the one described by L. Burch. A semicircular incision is made behind the cervix, the peritoneum opened and a suture passed through it, for further identification. The pelvis is explored by inspection and palpation and gauze packs placed above the brim, to keep the small intestines from getting into the operative field. An incision is then made from the centre of the semi-

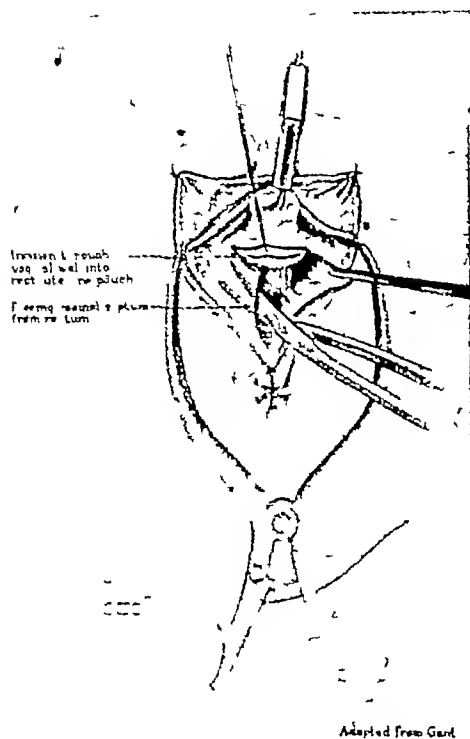


Fig 6

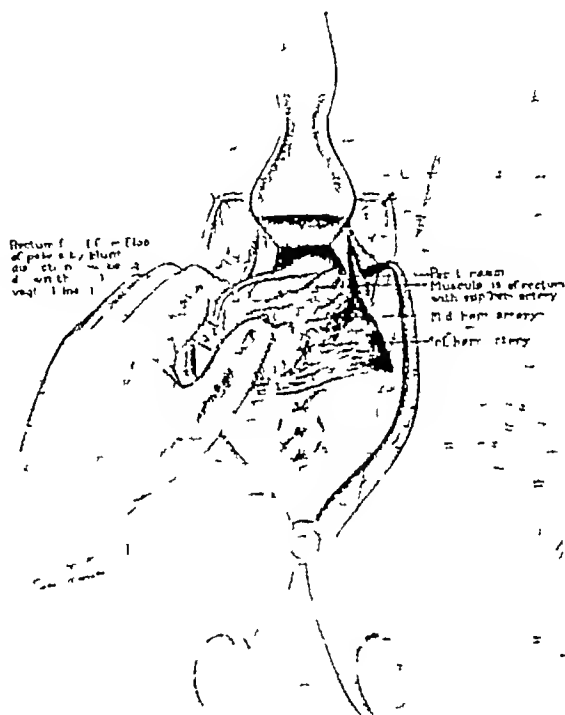


Fig 7 Oozing was controlled by suitably placed packs, the middle hæmorrhoidal vessels were ligated, and the gut was freed from the levator and down to the anus.

circular incision down to within half an inch of the anus. This incision is carried down to the rectum with care not to button-hole it. (Adapted from Gant)

The superior hæmorrhoidal artery is ligated and divided between double ligatures and the gut divided with cautery between clamps. With the main source of blood-supply ligated and the peritoneum open it is quite easy to detach the upper end of the rectum from the sacrum with the finger working in one direction and then in another. The mesorectal and lateral ligaments are incised and the rectum separated from the vagina by dissection with scissors. Oozing is controlled by gauze packs, middle hæmorrhoidal

vessels ligated and gut freed from levator and down to the anus. The rectum and anal canal is then ligated to prevent leakage, and incised with cautery, and the whole rectum which is now detached is lifted out through the vaginal incision. The mucous membrane of the anal canal after being cleansed with picric acid is dissected out and removed. The clamp on the lower end of the sigmoid is then removed, a corrugated tube placed in its lumen, and held there by a silk ligature. It is then brought down, passed down through the anus and sutured to the anal margin with interrupted sutures. A drainage tube is placed in the peritoneal cavity and the peritoneum is closed by suturing it to the gut. At the lower end of the wound several interrupted sutures of catgut are carried through the levator ani on one side, the walls of the gut being grasped first and then the levator of the opposite side and tied. Both the drainage tubes are brought out through the vaginal incision. In some cases these drainage tubes are brought out through stab wounds.

Three cases are quoted below in which this method was followed in excising the rectum. In two of these the patients were suffering from carcinoma, and the third case was one of Lymphogranuloma Inguinale affecting the rectum and the anal canal.

#### CASE 1

Mrs L. N. N. Age 44. The patient was admitted in August 1934, for bleeding per rectum with prolapse of about eight years' duration. On examination a tumour of the size of a small orange soft with an irregular nodular surface and bleeding easily, was found situated about  $2\frac{1}{2}$  inches from the anal opening. From the appearance it looked like a polypus undergoing malignant degeneration. Operation was done on 23rd August 1937, under spinal stovaine. The vaginal walls were retracted. A transverse incision was made in the posterior fornix and the peritoneal cavity opened. From this a vertical incision was made up to within half an inch of the anal opening. The vaginal walls were separated from the rectum and the rectum completely isolated on all sides after separating the Levator Ani muscles. The superior and middle haemorrhoidal arteries were tied. The rectum was divided about two inches above and also below the site of the tumour. The mucous membrane of the remaining portion of the anal canal was removed completely with scissors and the remaining portion of the rectum was brought down and stitched to the skin margin of the anal opening. A small drainage tube was inserted through the incision in the vaginal canal and the vaginal incision closed with catgut. A rubber tube was inserted into the rectum and dressings put on. The patient was kept constipated till 29-8-34. Next day a purgative was given with good results. On 31-8-34, a small recto-vaginal fistula was detected discharging a little faecal matter which gradually healed up after about six weeks. Patient was discharged on 18th September 1934, feeling very much better. Pathological examination of the tumour showed adeno-carcinoma. When seen in 1938 she was found to be keeping good health and free from all symptoms.

#### CASE 2

Mrs D. Age 40. Admitted in June 1937 for an advanced carcinomatous tumour involving the rectum, anal canal and the posterior vaginal wall extensively and giving

rise to a rectovaginal fistula. The operation was done on 26th January 1937. A circular incision was made from the posterior fornix of the vagina round the growth encircling the rectum and anal canal and including the affected portion of the posterior vaginal wall. The peritoneum was opened in the Pouch of Douglas, and the rectum and the anal canal along with the affected posterior vaginal wall was completely isolated all the bleeding points being caught and ligated. The rectum was divided about  $1\frac{1}{2}$  inches above the growth and removed along with the anal canal, and the remaining portion of the rectum was brought down and stitched to the anal opening. The pouch of Douglas was closed, but the gap in the posterior vaginal wall was left open and the cavity packed with gauze. But the patient's condition grew worse and she expired about four hours after the operation.

This was an advanced case and was not fit for any operation.

### CASE 3

Mrs G. H. Age 30. Admitted in June 1937 for difficulty in defaecation for the last six months. About seven months back she started passing blood and mucus per rectum and then gradually developed difficulty in passing stools. On examining a hard nodular growth was detected about  $1\frac{1}{2}$  inches above the anal opening with obstruction of the lumen through which a probe could be passed with great difficulty. A T-shaped incision was made as described above in the posterior fornix and posterior vaginal wall and the pouch of Douglas was opened. The superior and middle haemorrhoidal arteries were ligated and the rectum and anal canal separated from the surrounding tissues with great difficulty. The rectum was found to be involved in thick fibrous tissue due most probably to the condition of Lymphogranuloma Inguinale. The whole of the lower rectum and the anal canal were removed and the bowel was brought down and stitched to the anal opening. A small drainage tube was inserted in the vaginal incision which was closed and dressings put on after inserting a big rubber tube in the rectum. The wound healed nicely without any complications and the patient was discharged in very good condition on the 17th day, after the operation. She never reported herself again. As the general opinion is that the lesion in lymphogranuloma-inguinale involves the perirectal tissues, even excision of the rectum does not give permanent relief. However it was not possible to find out what the final result was in this particular case.

### Summary

The advantages of this operation are (1) The function of the sphincter ani is retained. (2) Permanent colostomy is avoided. (3) Pelvic support is not weakened and abundant room is provided for the operation. (4) The superior haemorrhoidal vessels with the peritoneum opened are easily visualized and ligated. (5) Removal of sacral glands and the division of the lateral and mesorectal ligaments is possible when the gut is being mobilized and danger to ureters is avoided. Thorough drainage of all the parts of the wound is possible.

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# TEMPORAL LOBE ABSCESS OF OTITIC ORIGIN

(Report of two cases)

BY

DR N A AIENGAR, L R C P, M R C S

CASE 1—19th April 1928

*History*—Patient had some chronic suppuration of the middle ear on the right for several years past. A year and a half ago she was brought to the Krishnarajendra Hospital with the history of slight pain in the ear and some swelling in the neck. On examination then, it was found that there was a chronic suppuration of the middle ear. The membrane was not in existence. In the neck, the swelling was due to some matted glands, probably of tubercular origin. Chest examination revealed signs of early pulmonary tuberculosis. So, she was kept in the Hospital for a month and a half and her ear as well as her lungs treated. She improved considerably, the temperature was running normal. She gained weight steadily and the glands disappeared. At the end of that period, she was discharged from the Hospital, with express instructions that she must seek admission at the Local Sanatorium. She was also told that she must avoid further pregnancy. But, within a short time after she went home, she got pregnant. At full term, she gave birth to a child at the Vani Vilas Hospital, Mysore. The period of labour was uneventful. After ten days, she was discharged from the Hospital and she used to attend as an out-patient. Then she was advised to get admitted to the Sanatorium, which she did not do. Three months ago, it was noticed at that Hospital, that she had an attack of facial paralysis and was advised to go over immediately to the Ear and Throat Department of the Krishnarajendra Hospital, Mysore, and get treated. This again was neglected.

It appears that she was carrying on her house-work as usual in the morning, and at 9 A.M. she got an attack of convulsions and fell unconscious. The family doctor was consulted. He noticed that the attack of convulsions was Jacksonian in type and there was some discharge from the right ear with a swelling behind it. So, he advised that the patient be shifted to the Hospital. In the evening at 6 o'clock, the case was brought to my notice. Then, on examination, it was found that there was a foul smelling discharge from the ear, it was thick and yellowish. No view of the membrane could be had. The right mastoid region was swollen, red and inflamed. The patient was unconscious. Her temperature then was  $104^{\circ}$ , and her pulse 140, rapid and bounding. There was some rigidity in the neck, Kernig's sign was present. The knee jerks were exaggerated and extensor plantar reflex positive. The left arm and leg showed convulsive movements. The right side of the face drooped down slightly. On drawing the Cerebro spinal fluid, it came under slight pressure and was slightly turbid. Microscopic examination of the C.S.F. showed over 1,000 leucocytes per c.m.m., mostly polymorphs. No ophthalmoscopic examination could then be carried out. However, it was suspected that she had an abscess in the right temporal lobe. So it was decided to operate immediately. Morphine-atropine was injected hypodermically. Under local anaesthesia, an incision as for a mastoid operation was made. Under-lying bone was bereft of periosteum. A sequestrum one and half inches in diameter was found separated, in removing it, a large cavity made up of mastoid cells, antrum and the bony meatus was found covered with oedematous granulations and some cholesteatomatous material. The latter was removed and the granulations gently curetted. It was then found that along the whole length of the cavity posteriorly, the lateral sinus was lying exposed. In the

roof of the cavity along the whole breadth, the duramater was seen bulging. While curetting, this was slightly injured and some pus escaped out under pressure. The dura was incised along its longitudinal axis. Then, with a fresh knife the brain was explored. An abscess cavity was struck. One could pass a probe to the extent of 2 inches forwards, and backwards in the cavity. The wound was bipped and dressed. On the whole, nearly two oz of thick foul smelling yellowish pus was drained. Within 36 hours, the patient recovered consciousness, her temperature came down to 99° and the pulse to 120 per minute. Meningeal symptoms disappeared and her facial paralysis improved. Every day the case was dressed by me and fresh sterile drainage tubes were introduced.

20-4-28 to 1-5-28—The patient showed signs of improvement. Temperature came down to 99°F and was between 99° and 102°. Pulse 100-120 per minute. Mixed infection phylacogen injections were given and Iodine IV.

2nd May to 6th May 1928—The patient's condition deteriorated steadily. Temperature became hectic in type, ranging between 102°F to 104°F. Coma increased day to day and the patient died on the 6th evening.

#### CASE 2—9th March 1942

Patient age 9 years, boy. Had discharge from the left ear for the last 3 years. Eight days ago, the discharge became pus mixed with blood and the patient had increased pain in the ear and headache. The discharge then became reduced and the pain increased. The patient became partly conscious and began to have a meningeal cry. He had marked delirium and was highly irritable. He was taken to a dispensary, where he was treated for 2 days for Malaria.

When he was brought to this Hospital, the patient had almost no discharge from the ear. He was highly irritable and was very restless and screaming all the while. On examination, there was acute tenderness behind and above the left ear. There was definite retraction of the head and Kernig's sign was positive. A lumbar puncture was done. CSF was turbid and was pus like. The cell count was 500 per cmm. No definite organisms could be seen except for a few gram negative bacilli. An operation was decided on and was done on 9-3-1942. Morphine and atropine was given and under general anaesthesia an incision as for mastoid operation was made behind the left ear. The bone was chiselled as for cortical mastoid operation. In the roof of the cavity, *ae*, in the tegmen a pinhole opening was seen, through which pus was exuding and the bone in this region had been eroded. A small sequestrum was seen here which was removed gently, the bone was curetted. The dura mater was seen bulging along the space now exposed after removal of the sequestrum. The dura was incised along its longitudinal axis. Pus with a bad odour resembling B. Coli pus gushed under pressure. A double cigarette drain was introduced into the cavity and a suspension of one tablet of M & B 693 in 10 cc of normal saline was introduced through one of the tubes.

For the next 24 hours the patient was more conscious and was less irritable. He was given Protosil rubrum soluble 5 cc IM in the morning and M & B soluble 3 cc in the evening. The temperature was between 100 and 102°F. The next day the intracranial cavity was irrigated slowly with a mild solution of Iteol and the two cigarette drains were reinserted after sterilizing. A suspension of a tablet of M & B in 5 cc of normal saline was introduced into the cavity through one of the tubes.

For the next 3 days, the patient showed signs of improvement. He was more conscious and was asking for bedpan and food. The temperature also came down to 100°F. On the 5th day the temperature suddenly rose to 103°F. The patient again lapsed into

drowsy state with muttering delirium. The pulse rate which had improved, again increased to 120 per minute, poor volume and tension. On the dressing table, more pus was evacuated than on the previous days, and while irrigating bits of brain matter were seen coming out in the returning fluid. Lumbar puncture was not satisfactory on this day and we could only withdraw 5 cc of almost puslike fluid. The patient became worse and passed away on the 6th day after admission. An X-ray could not be taken for want of an apparatus and a post-mortem could not be done, as the relations did not permit it.

### Comment

The usual signs of abscess in the brain with increased intracranial pressure are said to be headache, drowsiness, vomiting, slow pulse and sub-normal temperature. But it has been found that in the early stages the symptoms are usually the same as that met with in cases of retained pus elsewhere, namely—rapid pulse, fever, general malaise, anorexia. Headache is not severe usually. This phase may lead on to unrestricted encephalitis with rapid development of severe headache, vomiting and drowsiness as a result of increased intracranial pressure. In the two cases noted here, the temperature was high, going up to 104°F and pulse 120 to 140 per minute, rapid and bounding. There was no history of vomiting.

*Examination of C S F*—In a brain abscess, the C S F is said to be clear. It contains a slight excess of cells from 18 to 95 per cmm and they are mainly lymphocytes, protein content is normal, chlorides is normal, sugar reducing bodies are present. These hold good only so long as the abscess is localised. A preponderance of polymorphs with reduction of chlorides and absence of sugar reducing bodies goes with the clinical evidence of meningitis and means that the abscess is leaking either into the ventricular system or sub-arachnoid space. The moment of collapse probably marks the occurrence of leakage into the ventricles. Increase of pressure in C S F may be found preceding a complaint of severe headache or other signs of intracranial pressure.

Here again, we find the C S F in the first case was not under pressure. It was fairly turbid and the leucocyte count pointed to 1,000 per cmm and the cells were mostly polymorphs. No tests were carried out to find the existence or not of chlorides and sugar reducing bodies.

In the second case also C S F was under moderate pressure with cell count of 500 per cmm.

When pus collects in the neighbourhood of the Sylvian fissure, patients suffer from attacks of Jacksonian epilepsy. This is due to the fact that the cortex is pressed upon. If the C S F shows the usual picture found in brain abscess, it means that the communication from the brain to the ear has been blocked from the general subarachnoid space and would more usually pro-

gress into the cerebral substance. The infective process then spreads laterally in the plane in which it has been arrested. The process is slow and the abscess is silent until it reaches above the Sylvian fissure to the face and arm area of the motor cortex. Immediate recognition of such cases is of importance, lest the convulsions be interpreted as a first sign of generalised meningitis and a chance of immediate operative relief be missed. The distinguishing features are the sudden onset of convulsions or paralysis of the cortical type and the findings in the C S F.

The first case noted above had Jacksonian convulsions while the second case had no convulsions. This shows the infective process has reached the Sylvian fissure in the first case and that it must have been localized in the temporal lobe in the second case. Probably the infective process instead of spreading along the Sylvian fissure must have leaked into the ventricles and thus brought on the collapse in the second case.

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# REPORT OF TWO GALL BLADDER CASES

BY

DR N A AIENGAR, L R C P, M R C S,

AND

DR S T PARTHASARATHY, M B B S,

SRI CHAMARAJENDRA HOSPITAL, HASSAN

Gall Bladder conditions are not so commonly met with in this part of the country and the following two cases occurred in quick succession and are of interest

## Spontaneous Rupture of the Gall Bladder

*Case 1*—Male adult age 42 years, clerk by profession, came with a sudden attack of pain in the abdomen at about 3 P M on 28-8-1941

*History*—The patient said that he was seized with an acute pain in the right side of the abdomen at about 9 A M. He had vomiting and did not have a good motion. He did not have any pain before. This was the first time he suffered from pain. The pain was colicky in nature.

*On Examination*—The patient was found to be in severe pain. There was definite tenderness in the right half of the abdomen. There was mild distention. There was no rigidity anywhere. W.B.C count was 10,000 per cmm. Temperature normal. Pulse 80 per minute, full volume and tension. The patient had a good motion after an enema. It was suspected to be a case of acute appendix and was advised operation, which he refused and went home. The next morning he again turned up with an aggravation of pain. The right hypochondrium, lumbar and iliac regions were rigid and tender. The other regions were flaccid. The temperature was normal. Pulse 100 per minute. Diagnosis of perforated appendix was made.

The abdomen was opened by the Mac Burney's incision. On opening the peritoneum, bile was met with. The appendix was found to be inflamed and retrocoecal and was not perforated. An appendicectomy was performed. A drainage tube was introduced to drain the right lateral gutter of the peritoneum.

The Gall Bladder was explored by an upper paramedian incision. The Gall Bladder was found to have ruptured at the fundus, with bile in the general peritoneal cavity. The Gall Bladder wall was very friable and with great difficulty a tube was stitched in and another tube provided drainage. No stones were felt in the biliary passages. The lower drainage tube of the general peritoneal cavity was removed on the third day and the upper tubes were removed on the ninth day. Bile drainage stopped by the fifteenth day. The patient was given Prontosil by mouth for the first 4 days. The patient was discharged 2 months after operation.

A month later the patient came back with acute pain in the right side of the abdomen, coming on suddenly. He had constipation. On careful enquiry he gave a history of dysentery some years ago. On examination the right hypochondrium was

tender and rigid The liver was palpable to an extent of 2 fingers below the costal margin The pain was referred to the right shoulder

W.B.C count 15,000 per cmm Differential leucocyte count polymorphs 91% Examination of stool no cysts and no ova Urine nothing abnormal The temperature was ranging between 99° to 101° in the first 24 hours The patient was given 5 cc 5% Protosil Rubrum soluble injection and 2 tablets thrice a day Septanilam 0.5 gm Emetin 1 gr IM was also given The temperature touched normal next morning and remained normal Septanilam and Emetin continued The pain was much better and by the third day there was localised tenderness in the right hypochondrium to the right of the original incision and fluctuation was elicited An incision was made here and a large quantity of pus was drained The pus was partly mucoid and some portion of it was chocolate coloured On probing, the probe took a direction outwards and backwards to a depth of about 4" A drainage tube was inserted The discharge progressively diminished and got mucoid in character with a yellow colour The fistula is still there, though it allows only a thin probe to a depth of 2", it is discharging mucoid material just sufficient in quantity to wet the gauze dressing in 48 hours

### Discussion

The patient had all the signs and symptoms of perforated acute appendix with peritonitis in the right lateral gutter, while on opening the abdomen, the Gall Bladder was found to have ruptured with bile in the lateral gutter The cause for the rupture, in this case was very obscure as no stones could be felt in the biliary passages Neither was there any history of injury The spontaneous rupture of the Gall Bladder could have probably occurred after torsion of the Gall Bladder

The occurrence of abscess in the right hypochondrium could be attributed to amoebic infection or due to pyococcal infection consequent on the peritonitis The more or less sudden occurrence of acute pain and rigidity in the right hypochondrium points to pyococcal acute suppuration probably of the nature of sub-diaphragmatic abscess Points in favour of this conclusion are —the pain referred to shoulder, the rigidity and tenderness in the hypochondrium, palpable liver which might have been pushed down by the pus, the absence of any upward enlargement of the liver and the ruptured Gall Bladder which he had The improvement after emetine injection, the colour of pus, absence of any organisms in the pus and the history of dysentery point to amoebic infection

### Distended Gall Bladder due to Torsion

Case 2—Adult male 35 years Ryot by profession Came with a history of pain in the upper abdomen with a swelling on the right side He gave a history of pain occurring occasionally once in a few months and the pain used to last for a day or two on each occasion Four months ago, he had the last attack of pain The present attack was of 5 days' duration The pain was most felt in the right upper abdomen and had a tendency to go round to the right side of the back The pain was colicky in nature The patient was constipated.

**On Examination**—The patient had a definite swelling of the size of a cricket ball in the right hypochondrium. The swelling extended from the costal margin in the region of the 9th and 10th costal cartilages near the umbilicus. The swelling was definitely traced under the costal margins and moved with respirations. It was seen to be in the abdominal cavity and not in the muscular layer. The patient had a very mild icteric tinge in the conjunctiva. Temperature normal. Pulse 80 per minute. Leucocytic count 10,000 per cmm. A diagnosis of Gall Bladder torsion was made. The abdomen was opened by Kocher's incision. The Gall Bladder was seen to be much distended and was not adherent to the surrounding structures or to the abdominal wall. Cholecystostomy was performed. When the Gall Bladder was tapped first, it was with difficulty that we could pierce through the fundus. 15 ounces of greenish thin fluid was drained on the table. The abdomen was closed with a drainage tube in the Gall Bladder. No stones could be felt in the biliary passages. In the first 24 hours, 20 ozs and in the second 24 hours 10 ozs of bile drained through the tube. The quantity progressively diminished and drainage stopped by the 15th day after operation. Pylopurin 5 cc was injected on the first day with an alkaline mixture and Hexamine by mouth. The patient was discharged 6 weeks after operation.

### Discussion

This case came soon after the first case with the difference that the Gall Bladder had not ruptured. The cause of the distention in this case also was doubtful and could only be attributed to torsion as no stone was found on palpation.

Our thanks are due to Dr. S. Gundu Rao for all the Pathological investigations and reports.

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# Association Notes

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The attention of all Members is particularly invited to the circular letter, regarding the Library of the Association, sent along with the December Issue of the Journal. Some generous contributions have already been promised. It is hoped further contributions in money and books will come in in the immediate future.

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The album of the Foundation Members is still far from complete. Those who have not sent in their photographs are requested to do so at an early date.

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The Prize Essay for Competition for 1942 is 'Infections of the Foot' and the essay should reach the Secretary before the 1st October 1942.

\* \* \* \* \*

## SUBJECTS FOR DISCUSSION

### 5th Meeting, Feb 1943

- 1 Laryngeal Carcinoma by Dr H. D. Gandhi and Dr S. G. Joshi, Bombay
- 2 Injuries of the Thorax by Dr C. S. Patel, Bombay
- 3 Surgery of the Gall Bladder

### 6th Meeting, 1944

- 1 Traumatic Surgery of the Skull by Dr R. N. Cooper, Bombay
- 2 Carcinoma of the Breast by Dr N. C. Joshi, Delhi
- 3 Urinary Lithiasis by Dr L. B. Joshi, Karachi

### 7th Meeting, 1945

- 1 Carcinoma of Rectum by Dr C. P. V. Menon.
- 2 Enlarged Prostate by Dr S. R. Moolgavkar
- 3 Fractures of the neck of the Femur by Dr B. N. Sinha

### 8th Meeting, 1946

- 1 Carcinoma of the Cheek by Dr B. M. Joly
- 2 Tuberculous disease of the Spine by Dr S. P. Srivastava
- 3 Hare Lip and Cleft Palate by Dr S. C. Sinha



# THE INDIAN JOURNAL OF SURGERY

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(Published by the Association of Surgeons of India)

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## QUARTERLY

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## NOTICE TO CONTRIBUTORS

Contributions to be sent to one of the Joint Editors, The Indian Journal of Surgery, S R Moolgavkar, 'Belle Ville,' Gowalia Tank Road, Bombay or C P V Menon, 'Binfield,' Kilpauk, Madras

Contributions should be type-written on one side of the paper only. They are accepted on the understanding that they are sent exclusively to this Journal and a statement to that effect must accompany every contribution. Illustrations will be the Copyright of the "Indian Journal of Surgery" and may not be published elsewhere without permission. Rejected contributions will be returned if accompanied by a stamped addressed envelope.

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# THE INDIAN JOURNAL OF SURGERY

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## CATARACT AND ITS OPERATIVE TREATMENT IN AYURVEDA

BY

M A NAIR, MBBS, DO (OXON), DOMS (LOND),

HON OPH SURGEON, STANLEY HOSPITAL, MADRAS

An opacity in the normally transparent biconvex lens is called Cataract Galen in the 5th century B C thought it to be a hypochyma "falling down" (= cataract) from the iris, Quarre in the 18th century held it to be a lens turbidity, Magnus, Knapp and others gave us our modern conception of the disease about two decades ago In the centuries—old Ayurvedic system also the appreciation of lenticular opacity is a comparatively later development Three thousand years ago NIMI is credited to have studied it, a thousand years later SUSRUTA thought and spoke of it, NAGARJUNA about the the same time included it in his 76 diseases of the eye and in the 14th century Vagbhata classified it in his Uttarastana

Of the 27 diseases of this classification due to the humoral imbalance of the "Tridosha theory," tabulated under *Timira*, *Kacha*, and *Linganas*, we are here concerned only with the operative treatment of cases considered operable by them The text is exhaustive on descriptive details of the choice of place and patients and other connected details in a language so wonderfully poetic but in a manner so unhappily disjointed Neither in the selection of cases nor in the operative technique do we find a connected account given in the order we are used to From the promiscuously strewn lines of art and beauty by that versatile Vagbhata the following points are fished out to present a cogent narrative

In their selection of a case for operation we read (विच्येत्सु जात निप्रेक्ष लिङ्गनाश कफोद्भवम्) operate on a case of cataract when KAPHA is the chief offending "dosha" This variety has certain classical features (शङ्खेन्दु कुन्दकुसुमै कुसुदैरिव चाचितम्) the appearance of this type will look like conch, moon, white lotus

or jasmine flower and at a later stage will produce an oily appearance in the pupillary area and (विन्दुर्जलस्यैवजल पद्मिनीपुटसंस्थित ) the cataract will behave like a drop of water on a lotus leaf

Certain contra-indications are mentioned in the text (नविध्येद सिराहाण । नटक्पीनमकेमिनाम्) do not operate on patients suffering from cough, high blood pressure, uncontrollable vomiting, head ache, sinusitis. Avoid also (आवर्त कयादिभिः . षड्भिर्विवर्जितमुपद्रुवे ) patients having the six diseases mentioned under "AVARTAKA" group, viz, Iritis, Posterior synechia, and other complications

### *Preparation of the Patient*

After the usual "VAMANA-VIRECHANA" method of purgatives and emetics given in the text and after (अथ मा गरणेकाले शुद्धसंस्मोजितारमन ) a light appropriate feed immediately before the operation the patient is taken to the theatre in the morning hour on an auspicious day. He is seated and held in position by assistants. The doctor is ready for the operation and (मिषग् जानृच्चपीठम्) he sits on a stool knee high in front of the patient. He blows on the eye to be operated (अगुष्टमुदिते नेत्रे) and massages the lids with his thumb. The patient is directed (स्वनासा प्रेक्षमाणस्य) to look to his nose and after steady-ing the eye (कृष्णादर्धांगुलमुत्तवा तदधार्धमपागत ) the point of incision is selected by measuring half a finger's breadth from the limbus and a quarter of a finger's breadth from the external canthus. The instrument SALAKA (तर्जनीमध्यमगुष्टे शलाका निश्चल वृत्ताम्) is held firmly with the thumb, index and middle fingers. The tip of it is fixed at the measured spot (देवच्छिद्र नयेत् उर्ध्ववामन्ध्रयन्निव) free from blood vessels at a dimple where nature forms a notch and the instrument is passed by screw movements towards the cataract, using (अथ दक्षिण हस्तेनेत्र सत्येन चैतरम्) the right hand for the left eye and vice versa. The cataract is pushed towards the nasal side and if the capsule breaks (शलाकया स्ततोऽग्रनिलिखे नलमण्डलम्) coax the lens matter away from the pupillary area with the instrument.

If the operation has been successfully done a sound of its falling (विध्येन् सुविध्ये शब्दस्य) into the fluid is heard and after pouring breast milk into the eye, the instrument is withdrawn. With the application of some medicated oil to the eye and to the sole of his foot the eye is bandaged and the patient is sent to bed. He is directed (विद्धादन्येन पात्रेन तमुत्तान द्वयोर्व्यधे) to lie on his back if both eyes are operated and if only one, to lie on the sound side.

If there is pain in the eye open the bandage on the third day to apply proper medicine for "Vath" and bandage the eye afterwards. Repeat this

for seven days and the bandage is released on the seventh day whether or not there is pain. It is presumed that no medicine is put for 7 days if no pain is complained of. The patient is not allowed (अधोपुस्तस्थिति स्नान दन्तधावन मक्षणम् सप्ताहं नचरेत्) to sneeze, cough, bend or walk or clean the teeth or bathe for seven days. He is not (रूपाणि सूक्ष्मदीप्तानि सहसा) to look at minute objects or bright lights till the eye is fit for it.

A few complications during and after the operation are mentioned (स्थिरे दोषेचलेष्वपि) if there is synechia, hot fomentations and some medical treatments are advocated before this couching is undertaken. If there is pain (शोफरागरुजादिनामधिमन्यत्य) redness, swelling of the eye after the operation resulting in Endophthalmitis proper medical regime is enjoined for each of these conditions.

# SURGICAL TREATMENT OF PULMONARY TUBERCULOSIS\*

BY

RAO BAHADUR G D KAPUR, M S, F R C S (LAHORE)

Before I deal with the subject of my paper I wish to make my own position clear which is that of a general Surgeon, general in the sense that I had to deal, during my long career at the King Edwards Medical College, with all kinds of surgical operations including those intended for the treatment of various forms of tuberculosis. My approach to the present subject therefore is by no means that of a specialist, even though my interest in pulmonary tuberculosis is as lively as in other varieties of surgical work.

As you, gentlemen, are aware, the treatment of pulmonary tuberculosis hitherto has been regarded largely as a matter of a physician's concern, and the methods followed in its treatment, such, for example, as open air, nutritious diet and the sanatorium regimen are too well known to be repeated here. Three great changes, however, of a somewhat fundamental nature have taken place in recent times which have transformed the whole conception of the treatment of this foul disease. One is the discovery by Robert Koch of the tubercle bacillus, another is the extensive employment of X Rays in studying the condition and progress of this disease at different times, and following these two is the practice of bringing about a collapse in the diseased lung as a method of treatment.

The success achieved as the result of these three great changes leads one to believe that the treatment of tuberculosis can and should, no longer be entrusted to a physician alone. Indeed, recent statistics gathered from the Quarterly Bulletin of the League of Nations confirm this view. According to this Bulletin as many as 24.7% of the patients who had been treated in the earlier stages in a sanatorium, succumbed to the disease within five years of their discharge from such institution, whereas the mortality in the 2nd and 3rd stages within the same time was as high as 69.9% and 95.5%, respectively.

On the other hand, statistics show that surgical treatment, when added to the general measures, has yielded much better results. This fact may be estimated from the many tables published by the various clinics where collapse therapy is being extensively employed.

As to the great value of the application of the methods of collapse therapy, there are perhaps no two opinions, particularly during the second

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\* Paper read at the opening of a discussion at the 4th Annual Conference of the Association of Surgeons of India

and third stages of the disease. Its need during the first stage, however, is disputed by some. In my humble opinion which is shared by many others, the usefulness of collapse therapy even in the first stage is unquestionable. For, it is quite simple to realise that the earlier the lesion, the less are the risks of surgery to which the patient is subjected.

Pulmonary tuberculosis having thus become a medico-surgical disease it is very necessary that all sanatoria should have on their staff a surgeon who has made a special study of thoracic surgery. It should be realised, in this connection, that proper recognition of the place of a surgeon in the schemes and plans of treatment of this disease in organised institutions will improve the lot of humanity, quite 1/7th of whom lose their lives through its dire effects. It is the presence of the cavity in the lung which is the kernel of the problem and which needs closing through surgical measures, apart from the old fashioned provisions of fresh air and forced feeding which, by themselves, too often prove ineffective. One practice in this connection which has appealed to me the most and which I wish to bring to the notice of all those connected with the Hospitals for Tuberculosis is that which is followed at Michigan State Sanatorium, where at weekly meetings of the whole staff, each patient is thoroughly examined and evaluated and the best line of surgical treatment settled by a majority of votes. This ensures a composite line of action based on the joint experience of both physicians and surgeons.

It has been estimated that as many as one half of those affected with this disease are fit subjects for surgical intervention, although under Indian conditions this percentage may be a little less because many patients here are rendered unsuitable for any treatment whatever by the time they come to the notice of a trained physician.

The cases with contra-indications are limited to a few who have progressive extensive bilateral lesions, a failing cardiac or respiratory reserve and extra pulmonary tuberculous extensions of an advanced nature.

The basic principles of surgical intervention are now mainly accepted and widely practised and out of the enormous work, experimental as well as clinical, that has been done, certain measures stand out pre-eminently justified. They are —

- Artificial pneumothorax,
- Phrenic paralysis,
- Intra pleural pneumonolysis,
- Oleo thorax,
- Extra pleural pneumonolysis, and
- Thorocoplasty.

These are the various procedures that have been practised in the surgical unit of the Mayo Hospital, Lahore. As to which procedure to adopt in a given case, is a problem that should be decided by joint consultation between the surgeon and the physician, each of whom should possess some of the characteristics of the other so as to counter balance the over enthusiasm of one specialist with the undue timidity of the other.

I will now deal seriatim with the scope of each operation and will show you from films some of the results that we have been able to achieve in our Hospital by following these procedures.

### Phrenic Paralysis

The value of Phrenic paralysis is now established beyond dispute both as a single measure and in association with other collapse procedures. The fact that the nerve could be paralysed for, say, 6 months has added to it the advantages of a revocable operation and has much extended the indications for its employment.

A few points of anatomy must be kept in mind if its full value in collapse therapy is to be obtained. The nerve takes origin from the 3rd, 4th and 5th cervical roots but the main branch comes from the 4th. In the majority of cases the nerve is a single trunk in the field of operative exposure, but in about 25% of the cases it receives an accessory branch from the 5th cervical which passes downwards with the nerve to the subclavius muscle and joins the main stem of the nerve at some point below the level of the subclavian vein. Thus is explained the uncertainty in the clinical results when section of the main nerve produces only an incomplete paralysis.

The operation is carried out under 1% novocaine with the patient in the dorsal recumbant position with the shoulders slightly elevated and the head extended and turned to the opposite side. A transverse skin incision is made  $1\frac{1}{2}$ " long and 1" above the upper border of the clavicle in the natural skin crease, beginning at the posterior border of the Sterno-Mastoid. The skin, platysma and the fascia are divided and the fat covering the scalene muscle is exposed. This fat is divided by blunt dissection by repeatedly inserting and opening a haemostat, 2 blunt retractors are introduced, and the brachial plexus exposed as it lies between the scalenus anticus and medius. This is the best landmark, the nerve is seen immediately beneath the fascia as it crosses the scalenus anticus obliquely from above downwards and forwards. After location it is raised on a hook and its accessory root located, the nerve is crushed, excised, or avulsed according to the indications and the wound closed by suture. Avulsion of the nerve carries a greater danger than crushing or excision (Gaetze) and the tendency of the day is to rely more and more on crushing the nerve with mosquito forceps in order to produce temporary paralysis—a revocable procedure.

Phrenic paralysis is useful not only in basal disease, but even in apical disease with thin walled cavities not more than 3 cm in diameter or with soft infiltrations. It also is of value at the termination of an A.P. therapy, where there is a danger of reactivation or tearing of the lesion due to too high negative pressure. It is not done now-a-days as a routine preliminary to thoracoplasty, as it interferes with effective coughing at a time when one is most anxious to encourage it.

It must be emphasized that it is a mistake to expect too much out of such a minor operation. There is a great deal of controversy about its real usefulness in apical lesions. Perhaps the best course to adopt will be to crush rather than divide the nerve so as to produce a temporary paralysis, which is calculated to last for about 6 months. If the apical lesions heal during this period, the paralysis could be made a permanent one, if they don't one has recourse to alternative procedures the best being limited apical thoracoplasty.

### Closed Intra-pleural Pneumonolysis

This operation, first described by Jacobaeus in 1913, is a valuable addition to the pneumothorax treatment of pulmonary tuberculosis. In the peculiar conditions in India where cases come to one's notice in an advanced stage, pleural adhesions are present in a vast majority of them, indeed as many as 80% of the cases resist closure by an artificial pneumothorax. It is obviously imperative, therefore, that every institution carrying on A.P. must be in a position to command the services of a trained surgeon, on the spot, in order to deal with such adhesions.

As a routine, one waits for 3 months to make sure that the A.P. is achieving what was expected of it, except in cases of haemoptysis or severe pleural reactions after every A.P. fill. If, at the end of this period, pulmonary collapse has not taken place it is not likely to occur, and one must determine according to the findings whether a supplementary surgical operation will not help in making it effective. The XRay film reveals the presence of adhesions which are responsible for the failure of pneumothorax and which need dividing to free the lung to collapse and the cavity to shrink. Although the first indication is given by the X Rays, the final decision to cut down the adhesion has to be made through thoracoscopy because an adhesion looking localised and drawn out on an XRay film, may turn out, on visualization, to be a broad and thick one, inviting disaster, if cut.

The site for puncture of the chest wall is determined for each patient from a careful study of his X Rays, the area chosen is anaesthetised with 1% novocaine. A tiny transverse incision, 1 cm long is made through the skin and the trocar and cannula are inserted immediately above the upper border

of the rib As soon as the pleura is penetrated, the trocar is partly withdrawn and the cannula passed into the pleural cavity for 2 cms the trocar is then completely withdrawn and replaced by the telescope Having decided that the adhesion is suitable for division, the cautery is introduced through another cannula, usually in the mid axillary line, as from there, the majority of adhesions, which are invariably attached to the postero-lateral thoracic wall or the dome of the pluera, can be approached

If the adhesions are few and cord like, pulling upon and keeping the cavity in the lung open, the operation gives almost dramatic results If, on the other hand, the adhesions are numerous and thick, containing blood vessels and lung tissue, the operation is full of danger in the shape of intrapleural bleeding, empyema (tuberculous or mixed) and obliterative pleuritis It is essential, therefore, in such cases that one must weigh carefully the advantages and risks of pneumnolysis with thoracoplasty In tuberculosis, the surgeon should be prepared not to pin his faith on one single measure but should be capable of chosing the best possible operation or combination of operations for the lesion in hand

In a disease with diverse types of lesions and in patients in different states of reaction, a pet form of operation is obviously out of the question, and if a frontal attack fails it should be supplemented by successive flank manoeuvres till a successful result is accomplished

In cases of pneumothorax complicated by effusion or when effusion has followed pneumonolysis or even spontaneously, obliterative pleuritis often sets in and prematurely closes the pneumothorax cavity, before the lesion in the lung has healed

### Oleothorax

A 5% solution of Gomenol in olive oil or paraffin has been injected into the pleural cavity with some fair prospects of success Oleothorax is also employed in the treatment of a pure tuberculous empyema, if thoracoplasty is contra-indicated or before thoracoplasty is undertaken The main objection to its use is that the oil may rupture into the lung with serious and often fatal complications Hence oleothorax is going out of favour and is not practised so much now, as formerly, because better alternative surgical procedures are available The operation is, however, a revocable one, that is, it can be abandoned in of favour other surgical methods if it fails in achieving its objective

Oleothorax, like pneumothorax, comes within the province of the physician and so I will not deal with the technique of its induction and its subsequent management

### Extra-pleural Pneumonolysis

In this operation the endothoracic fascia is entered into and both the pleura and the lung separated from the chest wall. It would seem an ideal operation for the collapse of pulmonary cavities without collapsing functioning uninvolved lung tissue. Since a localized collapse is feasible, it is permissible to use this procedure in cases with bilateral apical cavities as it does not affect the function of the remaining undiseased portion of the lung. It reduces the volume of the freed portion of the lung, in direct proportion to the volume of the filling used. The only serious objection to this operation is the fact that no entirely satisfactory filling material has been found so far. Many materials such as oil, paraffin, rubber bags, gauze, fat and muscle have been tried but all of them have serious drawbacks. Under infiltration anaesthesia, a vertical para-vertebral incision six inches in length is made half way between the angles of the ribs and the spinous processes. This places the incision posterior to the defect that will be made in the rib and thus helps to retain in place whatever filling is introduced. The 3rd (or 4th rib which lies opposite the spine of the scapula) is identified and resected for  $1\frac{1}{2}$  inches (4 cms) at the level of its angle. The extra-pleural space is now defined and the lung apex with its visceral and parietal pleura is stripped from the thoracic dome in this extra fascial plane. The stripping is carried down to the 7th rib posteriorly, 3rd rib anteriorly, and just above the hilum of the lung on the mediastinal aspect. The chest wall is closed carefully in layers, and the extra-pleural space is entered with a needle attached to a pneumothorax apparatus and air is introduced into the space to act as a collapsing material. On successive days following this operation, refills are introduced to keep up the pressure in the collapsed lung.

In thoracoplasty one collapses the lung by collapse of the thoracic wall while in extra-pleural pneumonolysis, the thoracic wall remains intact. It is the pressure of the filling material that keeps up the collapse. The chief merit of the operation is its selective collapse, where intra-pleural pneumonolysis has failed or is contra-indicated. It is associated with only moderate shock and post-operative reaction, and, therefore, could be done on 'poor risk' patients who cannot stand the greater risks of the standard thoracoplasty operation.

Critically reviewing the status of extra-pleural pneumonolysis in the armoury of thoracic surgery Tudor Edwards reports in the latest Medical Annual that this procedure has tended towards limitation rather than extension of its use. Prof Nissen after 9 years' experience of its use deprecated the tendency to extend the indications for its use. In his view, thoracoplasty and its various modifications are superior to extra-pleural pneumonolysis which should not be considered when it is possible to adopt the former methods. In the opinion of some phthisiologists there is only one absolute

indication for this operation namely early stabilized lesions at the apex with slight involvement of the contralateral lung. In border-line cases where neither is contra-indicated, thoracoplasty is the operation of choice as the results achieved are final. Also when embarking on this operation, if we cannot proceed smoothly owing to extensive adhesions in the extra-pleural space, we must give up the operation and start thorocoplasty provided the condition of the patient otherwise permits.

### Thorocoplasty

When all other measures have been found wanting and in the opinion of some even at the very start in suitable cases, resection of rib offers the best prospect of a complete arrest of the disease and when that cannot be achieved, of relief of symptoms and prolongation of life. This operation if performed early in the disease before extensive destructive changes in the lungs and before secondary visceral damage have occurred will cause a minimal mortality, and a maximal conservation of respiratory function. The number of ribs to be removed, the stages of operation necessary in a given case and the most opportune time for resection are dependent upon many factors and demand the closest collaboration between the phthisiologist and the thoracic surgeon. An apical cavity, for example, may be found to have collapsed after the first stage operation, consisting of the removal of the first two and a half ribs. Another may require two stages and another with cavities in the lower as well as in the upper lobes may require a 3 stage operation for an effective collapse. The modern multi-stage operation with less shock and a smooth post-operative reaction, and a mortality no greater than that from appendectomy has been responsible for its widespread popularity. Too much time, therefore, should not be wasted before it is undertaken when other measures hold no reasonable promise of success. If the lesion involves only the upper lung, partial thorocoplasty is now universally accepted as the standard thoracoplasty operation.

With the patient in the semiprone position and the arm hanging over the edge of the table to facilitate retraction of scapula, regional anaesthesia is induced. When the patient objects to being operated on in a conscious state, he is given gas and oxygen with local novocaine infiltration. The incision extends from 6 cms below the upper border of the trapezius muscle and 6 cms from the spine downward to the level of the angle of the scapula and then outwards and slightly upwards to the post-axillary line. Sterile covers are fixed to the skin and the muscles incised. The scapula is elevated from the bony chest wall with special heavy retractors. This puts the digitations of the serratus anterior on the stretch. These are separated with a periosteal elevator or with scissors. The sacro-spinalis muscle next is separated from the upper 5 or 6 ribs, so that the entire posterior portion of the rib lies exposed. The third rib is dealt with first, half of it resected then the

second and the first To get a good collapse it is essential to remove the corresponding transverse processes with their underlying portions of the ribs As a rule two and a half ribs are removed at the first sitting After all bleeding has been completely controlled the wound is closed in layers without drainage Some surgeons routinely formalinize the periosteum to prevent early regeneration, others combine with rib resection apicolysis as advocated by Semb Both these procedures, viz, a partial thoracoplasty alone and a partial thoracoplasty with apicolysis are practised in our hospital, whereas in the latter, there is severe post-operative reaction, often alarming, in the former the convalescence is comparatively smooth

After three weeks' interval, the second stage is attempted and again after another three weeks' interval, the third stage, if need be Both these stages are easier to perform than the first and take less time

After a five rib thoracoplasty we resect the lower part of the scapula so as to permit the upper part to fall in and fill the space created by the collapse of the apical lung If this is not done, there is a tendency for the rigid scapula to pull out towards the collapsed lung and thus pull open a closing cavity

### Post-operative Management

A few points in the post-operative care must be emphasized Patient's posture in bed after return from the operation theatre should be such as to prevent accumulation of pulmonary secretions and their entry into the unoperated lung as well as to facilitate expulsion For several days he is not to lie on the unoperated side A shot bag weighing 4 or 5 lbs is applied on the anterior chest wall supplemented by strips of adhesive plaster to press upon the costal stumps and to steady the decostalized chest against paradoxical movements Oxygen is administered liberally This eases the dyspnoea, cyanosis and difficult coughing that may follow mediastinal or thoracic flutter The attendant in charge should encourage coughing as accumulation of lung secretions would not only increase the embarrassment, but is a potent factor in the spread of post-operative tubercular infection One must be alert to spot out signs of deep-seated post-operative infection Since superficial redness, oedema or tenderness are absent, there is a tendency on the part of the surgeon to ascribe fever, restlessness and other signs of toxæmia following operation to extension of the pulmonary lesion rather than to supervention of deep seated infection The operation is only undertaken when evidence of fibrosis in the affected lung is present, that is to say, the lesion must be at least of a year's standing (Traction displacement of trachea) The general resistance must be fairly good and the lesion should predominantly be a unilateral one, being a minimal pre-operative figure and the cardio-vascular system should be in a condition to meet the extra demands through shock, mediastinal flutter and paradoxical movements of the chest wall

The results of the modern operation of thoracoplasty done in stages have proved extremely satisfactory and, therefore, the older notion based upon earlier technique, that such operations should be done as a last resort must now be abandoned. All sanatoria must work in the faith, abundantly proved by the results of operations, that thoracoplasty is a life-saving measure. In our own Hospital at Lahore, surgery has become quite popular amongst tuberculous patients and we are hard pressed to cope with their demands. It would be a great step in advance if the various tuberculous hospitals pool their resources and employ adequately trained surgeons who could usefully devote all their energies to this special line of work. Particularly is this important at this time in view of the fact that through the great interest and efforts of H. E. Lady Lanthegow, new Sanatoria are being established all over this vast country. Let these be equipped on most modern lines by providing surgical facilities side by side with other usual amenities.

I must express my indebtedness to Dr. Wig for his help and to my Colleagues of the Surgical Unit for their courtesy in allowing me to draw up on their cases as well.

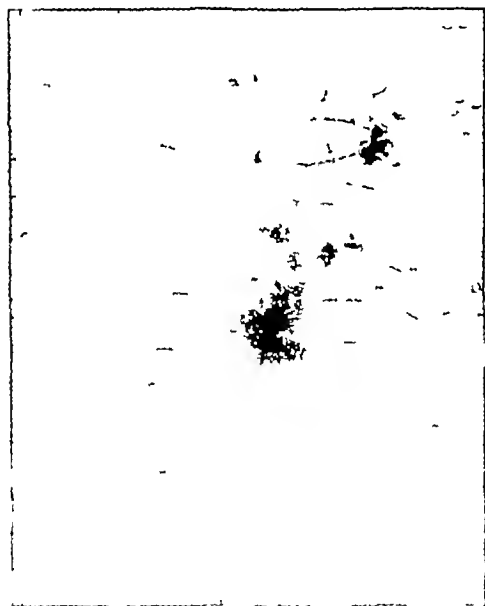


Fig 1 Iqbal Chand—25—H M, skigram 17-4-1941. A P was done on the left side but after about six months, obliterative pleuritis supervened and the lung began to re-expand.

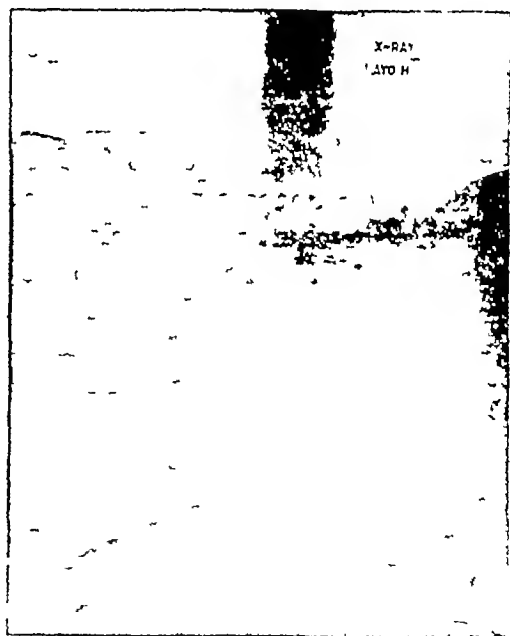


Fig 2 Same case as Fig 1 13-8-1941. The pneumothorax space has been completely filled with oil.

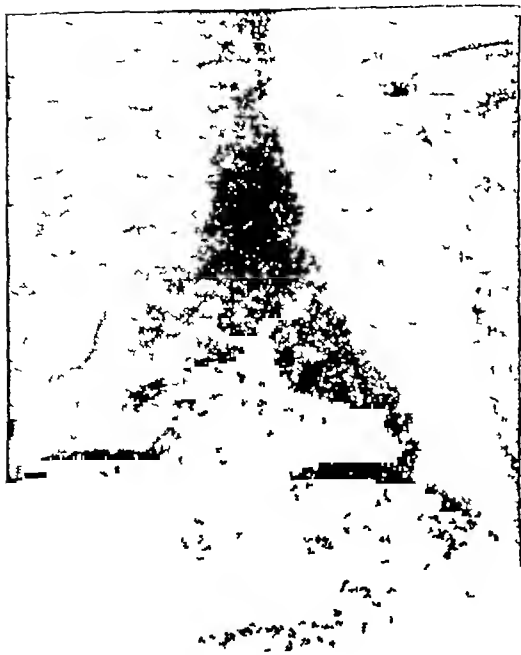


Fig 3 Trinetra Singh—50 H M 23—3—40 was referred by an outside Sanatorium A P had been kept up for some months The lung is partially collapsed, but a cavity is being held patent by a long stretched adhesion



Fig 4 The same case as Fig 3 10—5—1940 The adhesion has been cauterised The lung has collapsed well The cavity has closed down A small quantity of effusion is seen at the base

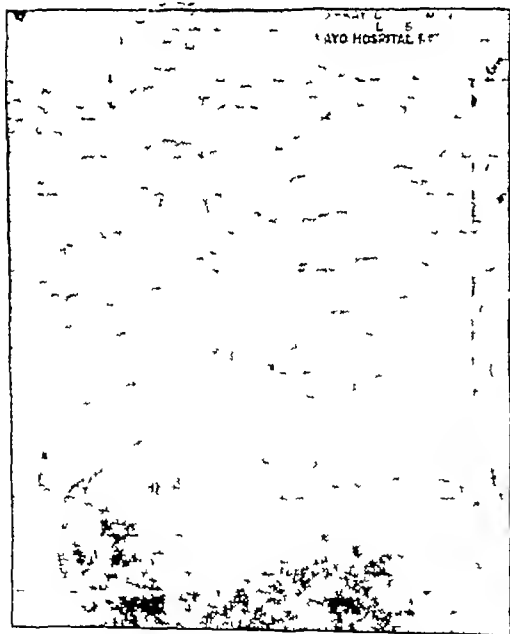


Fig 5 Bashir Akhtar—18 M F 31—1—41 The lung is fairly well collapsed, but three long and thin apical adhesions were preventing a further collapse Some cough and expectoration was persisting

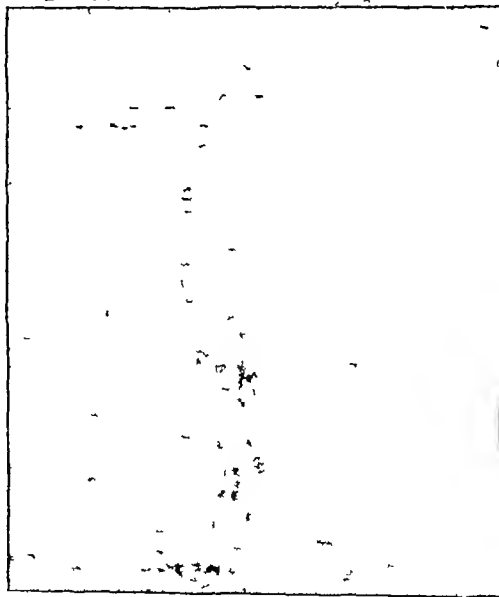


Fig 6 Same case as Fig 5 In a two stage operation, all the three adhesions been cut The collapse became very satisfactory All cough and expectoration disappeared

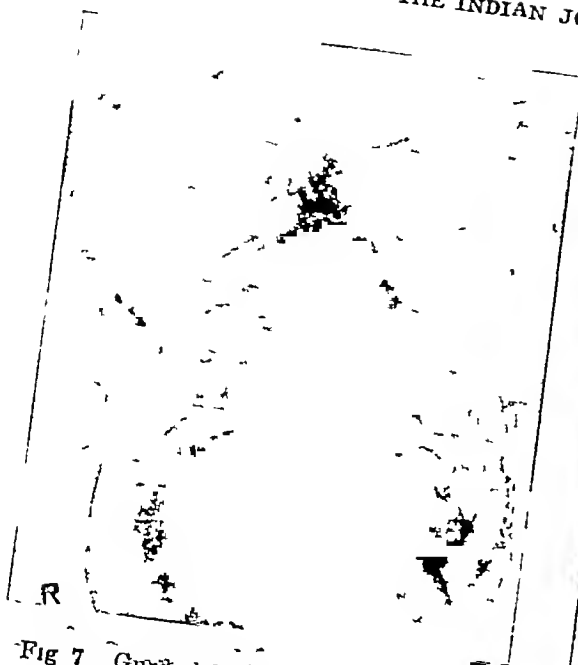


Fig 7 Gurdial Singh—20 S M 5-10-40  
Chronic fibrocaceous type of disease in the left upper zone with a cavity in the subclavicular area A P was found impossible due to an adherent pleural cavity Sputum was abundant and positive



Fig 8 Same case as Fig 7 2-5-39  
Upper five ribs have been removed The cavity is closed Cough and expectoration disappeared completely

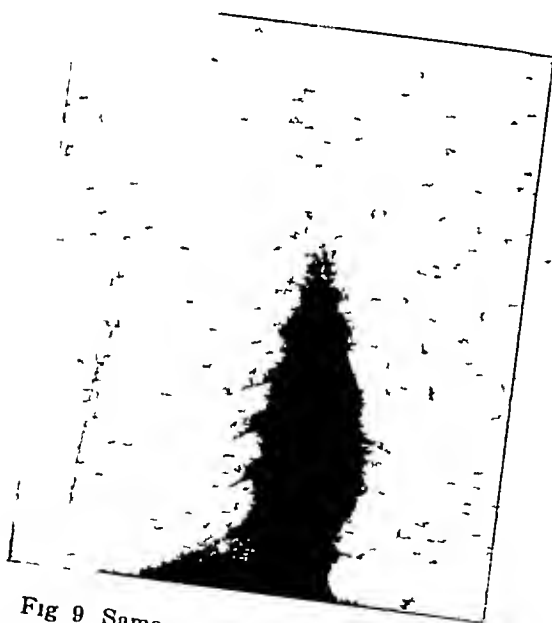


Fig 9 Same case as Fig 8 2-3-41 i.e., more than 2 years after the operation The ribs have reformed in the new position No cavity is seen Patient is free from all symptoms and there is no cough and expectoration



Fig 10 Shyama Nand—30 H M 18-11-40  
Chronic type of disease in the left upper zone There are evidences of a fair degree of fibrosis with a cavity in the infraclavicular area Sputum was moderate in amount and was positive A P was found impossible on trial

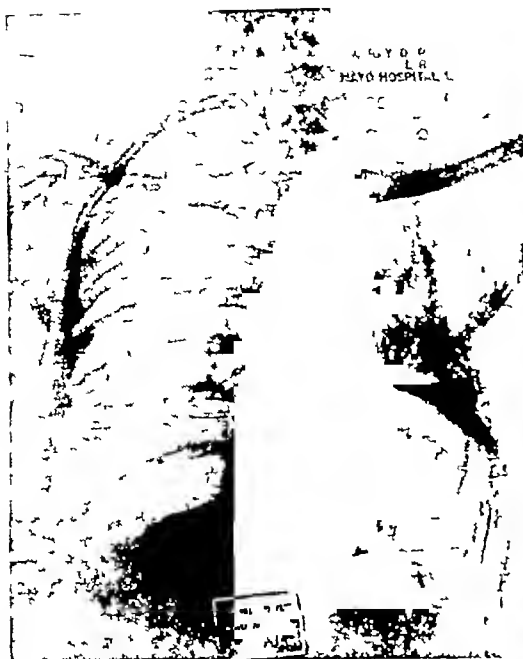


Fig 11 The same case as Fig 10 16-6-41 Seven ribs were removed in a three stage operation Cough and expectoration disappeared completely No cavity is visible



Fig 12 Mohammad Hafiz Ullah—22 M M 23-6-41 Caseous Pneumonic type of disease in the left upper zone with crepitations Daily temperature was above 101°F Sputum was positive



Fig 13 The same case as 12 13-7-41 Due to the high temperature and poor general condition of the patient, thoracoplasty was considered inadvisable after A P had failed -An expleural pneumothorax was done The diseased area has collapsed

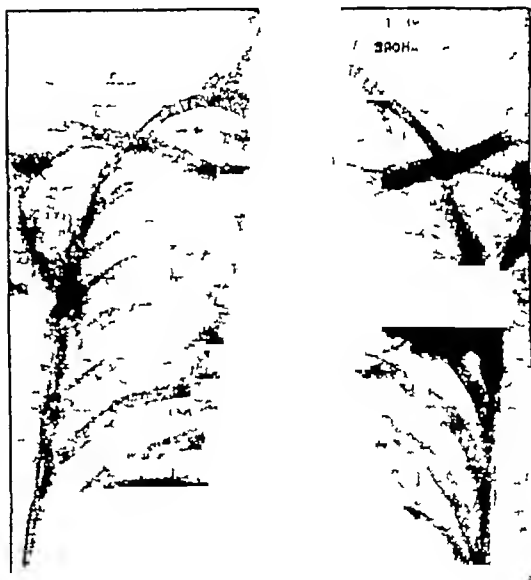


Fig 14 The same case as Fig 13 2-9-41 The extrapleural pneumothorax is being maintained A small amount of effusion has formed The lung is however, showing some signs of re-expansion It is being proposed that the extrapleural cavity be now filled with oil

After the operation, the general condition has improved considerably The temperature remains below 100°F Sputum has almost disappeared and is negative

## DISCUSSION

Dr K S Ray did not claim to have a large experience in the treatment of Pulmonary Tuberculosis. While cases suitable for surgical treatment were not few, lack of knowledge of the possibilities of surgery and want of co-operation resulted in only a small percentage of cases submitting to surgery. He did not wish to deal with pneumothorax as it was not essentially a surgical procedure.

He was disappointed with the results of Phrenic avulsion and does not perform the operation as often as he used to before. While undoubtedly useful in basal cases, the results even here were not uniform. In apical cases its value is doubtful and in some cases with lesions either at the apex or the base, the cavities have actually increased in size. He wished to know if any one else had a similar experience. Phrenic crushing he advocated as a simpler operation, but had the disadvantage that it made avulsion of the same nerve difficult if required at a later date. He agreed with Dr Kapoor that avulsion should not be performed as a preliminary to thoracoplasty.

With the object of elevating the diaphragm, as an adjunct to other methods he has practised pneumoperitoneum. Air is injected into the peritoneum through the linea alba or through a lower intercostal space. To facilitate the air remaining in close contact with the diaphragm the head end of the bed is raised on blocks. The diaphragm can be made to rise upto 4" by this means. The process has to be repeated as the air gets absorbed. In some cases great cardiac embarrassment is caused by pressure on the heart. Blocks are then removed to give relief. At times there is peritoneal irritation and patients complain of pain which is almost intolerable.

He has not much experience of oleothorax. The number of cases done was small. In some, cavities have closed.

Dr A C Ukil referred to the great difficulty in the assessment of the results of different procedures due to lack of proper recording. To get a proper idea of the benefit resulting from different operations the follow up system should be perfect so that the results both immediate and late may be known. Cases of failures should be particularly noted and the cause of such failures properly investigated.

*Artificial pneumothorax* He has carried out this procedure in 1,778 cases. In 25% of these he could induce complete collapse, in the remaining 75% collapse was incomplete and had to be supplemented by some other method of treatment.

*Phrenic operations* From the years 1933 to 1940 he has had 434 phrenic operations done. Phrenic crushing is being done in a larger number of cases of late and when necessary repeated. He got positive results in 60% of the cases and negative results in 40%. Cases should be carefully chosen. Thin-walled cavities in the lower lobe of the lungs are mostly benefitted. In upper lobe lesions better results are obtained if aided by scalenotomy.

*Oleo-thorax* He referred to a paper published in 1937 on the usefulness of oleo-thorax treatment in pulmonary tuberculosis based on his experience of the results of 50 cases thus treated. Used in different categories of cases positive results were obtained in 60%. With compressive oleothorax greater collapse was obtained than by A.P. He got good results in some cases of tubercular empyema with this treatment. He did not agree with Dr Kapoor that injection of Gomenol does no good. He has found it definitely useful in drying up and inspissating effusions in some cases helping finally in producing necessary adhesions.

*Thoracoplasty* A large number of cases suitable for operation are available. Operations could not be done in many cases not because patients were not willing to

submit to it, but the treatment could not be given to them because of want of hospital accommodation. Moreover, want of proper arrangements for the necessary care of these patients both preoperative and post-operative has been a great drawback. In spite of these difficulties during the year 1935 and 1940, 22 cases were operated upon. In 16, the lesions were arrested.

Dr Kapoor has expressed the opinion that he would prefer to operate upon cases with a cavity of one year's duration. He, however, held that whenever A.P. or other procedures adopted fail to attain their object in relaxing the lung, obliterate the cavities or render positive cases negative, the sooner thoracoplasty is performed the better for the patient. Then the operation would be performed on patients still maintaining strength and the number of ribs requiring to be removed would be the minimum.

He would like to know from Dr Kapoor if he has performed anterolateral thoracoplasty and with what results.

**Lt-Col Cruickshank.** The operation of thoracoplasty should be done early when the lung still preserves its power to expand if good results are to be expected. In cases with advanced fibrosis of the lung results were far less satisfactory. As to the operation, he followed the bilateral technique, operating on the anterior and posterior aspects at the same sitting. While removing the posterior portions of the ribs he dislocates the head of the rib from its articulation. This becomes easy if the costo-transverse ligament is divided and the head of the bone twisted out of its attachments to the vertebra. While operating posteriorly, one should be careful about the sympathetic cord. At the first sitting he removes the first three ribs. He does not believe in removing the 4th, 5th and 6th ribs at the first sitting as he does not consider it useful. The second stage operation can always be performed through the former incision. The scar tissue of the first operation is dissected out and the lower end is prolonged down for three to four inches. After the operation the arm should not be left free but kept firmly bandaged to the side.

**Col. Anderson.** Collapse obtained by removing the upper two ribs is unsatisfactory. The first stage operation should be limited and only three or four upper ribs should be removed. Dr Kapoor has not mentioned as to how he would deal with large cavities in the middle lobe. Neither has he told us anything about the youngest age when thoracoplasty could be justifiably performed. He would also like to enquire of him of the subsequent treatment that would help to prevent the disfiguring and crippling deformity of the chest and the spine. He considered apicolysis and extrapleural pneumonolysis much more helpful.

**Dr P Chatterjee** considered that phrenic crushing cannot be a scientific operation. The reasons that made the profession give up simple phrenicotomy as ineffective, work also with respect to phrenic crushing, viz., the possibility of the presence of an accessory phrenic nerve. It is never possible to anticipate the presence or absence of the accessory phrenic. Once phrenic crushing is performed and the result found to be unsatisfactory it is an extremely difficult task to pull out the nerve at a subsequent sitting. It is thinned out, becomes brittle and its elasticity is lost. He did not believe that if the whole nerve is taken out the diaphragm will always rise irrespective of any other influences. In some cases even when the whole nerve was taken out the diaphragm did not rise sufficiently. He held that surrounding adhesions play a very important part in determining the elevation of the diaphragm even after it is paralysed.

Cases are recorded where in cases of pulmonary abscesses immediately after phrenic avulsion the tracheal tree has been flooded causing suffocation and death. This was said to be due to compression of the lung as a result of sudden elevation of the

diaphragm He did not consider the explanation correct Radiological investigation has proved that the diaphragm does not rise to its maximum limit immediately after the operation, it rises only 1" to 1½" immediately after avulsion It goes on rising and for maximum rise it may take two to three months



Fig 15 Thoracoplasty 3rd to 9th ribs removed at two sittings Skiagram shows how efficient collapse is prevented when 1st and 2nd ribs are left out

In thoracoplasty operations the removal of the 1st and 2nd ribs is absolutely essential Even if the lower 7 or 8 ribs are removed in cases of basal or midzone cavities the collapse would not be satisfactory if the first and second ribs are left behind This is well illustrated in the skiagram (Fig 15)

He did not agree with Dr Kapoor in his technique of closing the wounds without drainage He did not consider it reasonable It is only inviting trouble and sepsis If infection takes place, however little it may be, it delays the second stage of the operation Even with the strictest possible care it may not be possible at times to prevent wound infection This can take place as auto-infection or by percolation of organisms through the pleura lying at the bottom of the wound already infected from the cavity in the lungs

Dr Sarbadhikary He did not agree with Dr Kapoor that the great drawback in carrying out artificial pneumothorax successfully was that in at least 80% of the cases there were adhesions. He agreed that many patients have adhesions but their percentage was certainly not so high

Phrenic crushing operation has the great drawback that if crushed above the level where the accessory nerve joins, when present, the collapse is almost always incomplete In one of his cases as early as two months after crushing there was recurrence of haemoptysis One should not take avulsion or crushing of the phrenic nerve specially of the left side lightly One should think of its after-effects on respiration and also on

the abdominal viscera. Loss of tone of the stomach, associated ileocaecal stasis, hypoperistalsis and symptoms of dyspepsia have been known to start after the operation causing great nutritional loss.

Treatment of pulmonary tuberculosis by oleothorax is practically given up. In the presence of pleural effusion oil introduced will never mix with it and it has hardly any antiseptic effect. It is better instead to introduce 2% gelatin with acriflavine starting from 1 in 4,000 dilution and increasing to 1 in 1,000 dilution.

Dr Susanta Sen considered extrapleural pneumonolysis a better operation because it was selective. There was no deformity after the operation, though the amount of collapse was the same. It would also be performed as a preliminary to Thoracoplasty in debilitated patients to diminish toxæmia and improve the general condition. He showed some skiagrams illustrating the results of extrapleural pneumonolysis.

Dr Kapoor replying to the many questions raised said

About phrenic avulsion and phrenic crushing, phrenic avulsion is an easier operation than phrenic crushing as the latter operation requires greater practice. It is strange to hear that hæmoptysis recurred after the operation of phrenic avulsion.

It has been said that it is difficult to identify the phrenic nerve at a subsequent operation once crushing has been done. The difficulty is solved if black silk or horse hair is tied round the nerve after it is crushed. I never had the occasion, however, to perform phrenic avulsion on a case where it had been already crushed.

*Scalenotomy* I have done only one case. So it is not possible for me to give any opinion.

*Thoracoplasty* Most surgeons subscribe to the view that the upper ribs should be removed first. I am always content with removing the first two ribs at the first sitting. My advice is not to be tempted to remove more ribs even if pulse and general condition is good, because patients may be able to pull through the operation but post-operative complications may develop and may be difficult to manage. So far as large cavities in the middle zone are concerned it is only necessary to remove the transverse processes underlying the necks of the ribs. The first rib should be removed with its cartilage, the second rib up to the cartilage, as to the third rib a part of the bone and the cartilage is left behind. So far as post-operative treatment is concerned more liberal removal of ribs give an anxious time. Thoracoplasty done in more number of stages does more good to the patients.

*Apicolysis and extrapleural pneumonolysis* These operations have great demand in our hospitals. They are attended with less shock and the results after the operations are good. The apex begins to re-expand in four to five months' time.

Younger surgeons prefer to perform extrapleural pneumonolysis while the older surgeons prefer thoracoplasty. Thoracoplasty is the best form of collapse therapy. A patient fit for extrapleural pneumonolysis will with a little care and pre-operative treatment be fit for removal of three or four ribs later on.

Variability of results after operation depends on the selection of cases and the methods employed.

Operative morbidity and mortality in selected cases in the best clinics is 5%. With latest postero-lateral thoracoplasty it is 4.5%. In our cases mortality is near about 10%.

# ACUTE ANTERIOR POLIOMYELITIS IN THE MADRAS PRESIDENCY

BY

DR N S NARASIMHAN, GENERAL HOSPITAL, MADRAS

The commonest type of infantile paralysis is anterior polio-myelitis which is the greatest of all physical disorders that can happen to a healthy child. This is a notifiable disease in all civilized countries.

In India, the Public Health Commissioner's Office does not possess any data of this disease and an enquiry was made by the Indian Research Fund Association in November 1940 regarding the prevalence of this disease. Every advanced country has adopted measures of notification, isolation and aid to societies for the crippled children. It is hoped that the following particulars of cases treated in the Madras General Hospital may stimulate proper treatment of this disease.

Of the total number of cases (299) seen in the past 4 years, available information is tabulated as below—

- (1) Sex—male 133 Female 100 = 233 (not noted in 66)
- (2) *Religion* —Hindu 194, Muslim 13, Indian Christian 19, Anglo-Indian 6, European 1 (not noted in 66)
- (3) *History of fever* —
 

Fever	147
No fever	39
No history of fever	6
History of fits	2
Not available	105
- (4) *Pain and tenderness of muscles in recent cases* . —
 

Present in	22
Not present	109
Late cases	168
- (5) *Alterations in the length of the limb* .—
 

Shortening—24 (one inch 3,  $1\frac{1}{2}$ " 3,  $1\frac{3}{4}$ " 2, rest  $\frac{1}{4}$ " and less)

Lengthening—2 (one inch 1,  $\frac{1}{2}$ " in one)

No alteration—56

Shortening of upper extremity by 2" at 10 years of age in one.
- (6) *Other changes in bones* —
 

Patella small	1
Shortening of upper extremity with small clavicle and scapula	1
Thickening of tibia	1
Genu varum	1
Genu recurvatum and bow legs	1



Fractures of shaft of femur in 2 and shaft of humerus in one were seen in three anterior polio-myelitis patients. They united well without any complications and in the normal average period. Bone operations on these patients generally do well.

(10) *Groups of muscles affected* —The common groups of paralysis are—

(A) (a) Inferior extremity 81% (of which bilateral affection constitutes 10% and unilateral 90%), (b) inferior extremity with paralysis of gluten 7%, (c) foot drop 15% and (d) flail foot 8%

(B) Upper extremity—(i) Deltoid with paralysis of extensors of forearm and hand and (ii) radial nerve distribution alone 1%

(C) 3% of cases had paralysis of both arms and legs. The flexors of the hand are rarely affected.

(A)		Single	Bilateral
Drop foot alone		3	
Flail foot alone		49	
Quadriceps alone		54	2
Calf muscles		7	
Posterior muscles of thigh		26	2
Ilio psoas		8	
Gluten		14	
Peronei		1	
Lower extremity	Left	30	14
	Right	17	
„ with gluten	Left	2	2
	Right	2	
Deltoid	Left	5	1
	Right	5	
Supraspinatus		1	
Neck muscles		5	
Spinal muscles		1	
	Left	12	
	Right	5	
		<hr/> 248	<hr/> 21

#### (B) Combinations

Both lower extremities and cervical muscles	1
Abdominal muscles with scoliosis	1
Both lower limbs, Iliopsoas and abdominal muscles	1
Foot drop and Hallæ Valgus	1

Quadriceps and footdrop	1	
Scoliosis and upper segments of both upper limbs and footdrop	1	
Right lower limb and left upper	1	
Left lower limb and Right upper	1	
Left lower and both upper	1	
Left lower and upper	11	
Right lower and upper	1	
Left deltoid and right foot drop	1	
Left deltoid and pectoral	1	
Flexors of right leg and muscles of right thenar eminence	1	
Both lower limbs, abdomen, and back (Scoliosis)	1	
All the four limbs and back	2	
Paralytic kyphoscoliosis	1	
(C) Loss of speech	2	
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	30	
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The disease is prevalent in all the districts endemically and no epidemics have come to my notice so far. Patients are not brought to the hospitals in early stages when many deformities can be prevented. Both sexes and all communities are equally affected, there is a preponderance in the incidence of the disease during the colder months of the year December and January, while in temperate climates it is commonest in late summer. The characteristic feature of the paralysis is its almost invariable want of symmetry, any group of muscles may be attacked and any muscle may be picked out of a group leaving the others normal. Loss of function is partial and never complete.

In this series there are cases involving the neck, sterno-mastoid and upper extremity muscles, cerebral types occur with hemiplegia and readily recover the lesion is spastic paralysis. Speech may be lost and the sphincters may be affected.

Hyperaesthesia is often described as an early symptom and pain is said to be almost a constant symptom. Pain varies in intensity and is usually of short duration. In Madras this hyperaesthesia is seldom noticed a fair number of cases (8%) occur before the age of one which is the usual period in temperate climates. The bones show rarefaction, become thinner than normal; the medulla is diminished in size and the bone is shorter than its fellow of the opposite side. Bones are stimulated to growth by the demands of function, shortening will be less when the leg is used for weight-bearing.

with proper splinting The degree of shortening has no relationship to the severity of the motor affection The bone near the affected groups of muscles is more affected than the remote ones

The recovery stage lasts two years, there is no case however apparently hopeless or uncompromising which cannot be benefitted by treatment Institutional treatment is to be preferred especially for the poorer classes

The recovery under treatment exceeds all anticipation It is impossible to foretell the extent to which recovery will take place In order to obtain the maximum of recovery in an affected muscle, the muscle should be kept relaxed to its fullest extent by suitable splinting the splinting should be continuous and uninterrupted Usually the more severe the attack and the more persistent the tenderness, the worse is the outlook in respect of recovery from paralysis, the muscles that remain entirely inactive at the end of six months have a poor chance of usefulness

*Electricity has no place in the treatment* of the disease, testing for electrical reactions is useful If there is no reaction to electric stimulation, regeneration is very doubtful and cannot be expected A long view must be taken with every patient Personal supervision is required from early childhood up to adult life The essential aims of this extended treatment are (a) the prevention of any crippling deformity (b) attainment of the power of walking in a nearly normal way and (c) education in a way suited to ensure a capacity for making a living

When is weight bearing to be permitted? The time limit for recumbency in a lower limb paralysis is nearly two years; hand massage, encouragement of active movements in a supporting splint, and warm baths with the corrected position maintained are useful

Weight bearing is to be postponed till it is certain that no further gain in muscle power is possible No muscle fatigue should result Too early weight bearing will cause muscle fatigue

Movement should be encouraged without weight bearing

The apparatus used are as follows and are all made locally

(1) Deltoid paralysis requires an abduction splint, the hand and elbow should be used by the patient

(2) For biceps paralysis—an elbow splint at right angles, hand movements should be encouraged

(3) Wrist—moulded leather splint in dorsiflexion

(4) For loss of opposition of the thumb—fix the first metacarpal in the opposed position by a graft between the first and second metacarpal For this operation to be successful flexor longus pollicis should be active

(5) A full length calliper is required only when there is paralytic dislocation of hip

(6) Pelvic band is required when there is paralysis of the glutei

(7) Jones crab splints are useful to rest the lower limbs in the early stages

(8) Later inside and outside steel uprights coming up to the upper third of the thigh are given

The movable knee joint is not to be fitted for a child, but only for adults. A patient with paralysis of both lower limbs will require crutches in addition

(9) Springs to control a drop foot or paralysis of the calf muscle are very useful. T Straps control the valgus or varus

(10) Jones' abduction frame with foot pieces is essential for paralysis of both lower limbs, abdominal pads help the abdominal muscles. Spinal braces are required in cases of paralysis of back muscles before the patient is allowed to sit up

Operative procedures are useful in stabilising joints and getting rid of apparatus. Triple arthrodesis of the foot with backward displacement of foot (Naughton Dunn technique) is useful, for flail foot. By shortening the foot it would not drag on the ground

Other modifications as Lambrinudi's operation are useful

Arthrodesis is best postponed till the age of 12 or later. It is practised in America even before 5 years. The following is a list of cases done in this series, earlier age is selected on account of the poverty of the patient. The ankle joint remains stable in the absence of muscle power and should not be fixed in cases of paralysis

#### AGES AT WHICH TRIPLE-ARTHRODEISIS HAS BEEN DONE

Age in years	5	6	7	8	9	10	11	12	13	15	18	20
No. of cases	3	3	3	4	2	1	0	6	3	4	1	1=31

The operation is very useful in stabilising the foot and in discarding apparatus—the majority of the poor people cannot afford the required apparatus. Some of these cases have been followed up and the results are satisfactory

Supracondylar osteotomy with backward displacement of the lower fragment really helps to steady the knee, the forward angulation tilts the

articular surface backwards Three patients were treated by this method at the age of 9, 10, 12 and the results are very satisfactory

Soutter's fasciotomy is useful for flexed hips

Arthrodesis of the knee is not advisable In one case it was followed by a fracture of the patella and in another by a fracture of the lower third of the femur

In cases of quadriceps paralysis with fixed equinus deformity of the foot, a triple arthrodesis with a fixed equinus position stabilises the knee and foot Operative procedures such as lowering the level of the great trochanter for the purpose of obtaining a more stable hip and a stronger weight bearing limb are advised For knock knee and tibial rotation in severe poliomyelitis, femoral osteotomy is performed to correct the lateral deviation

For deltoid paralysis—arthrodesis of the shoulder with the joint held about 70° abduction after the age 10 if there is control of the scapular movements and other muscles of the upper limb is good Tendon and muscle transplantations are used as an adjunct with arthrodesis My own experience is too small to draw any useful conclusions

### Summary and Conclusions

(1) The incidence of anterior poliomyelitis with reference to the age, sex, distribution, the period of onset, the group of muscles affected, the alterations in the length of the limbs, the seasonal distribution is noted

(2) The clinical peculiarities as onset of 8% of cases before the age of one year, the absence of hyperaesthesia and pain, the absence of epidemics, the greater prevalence of the disease during comparatively colder months is described

(3) Treatment as practised is given, the age period of 31 cases of Triple-Arthrodesis is noted

I am indebted to the Superintendent, General Hospital, for permission to utilise the hospital records and to Dr M V Lakshmanan, M B B S, Resident House Surgeon in the department for his help in looking after the patients and keeping notes

LIST OF PATIENTS ON WHOM ARTHRODESIS HAS BEEN DONE

No	Name	Caste	Sex	Age	Disease	Date of operation	Operation
1	Basheer	M	M	7	A P M Flail foot	17- 1-38	Triple Arthrodesis (Dunn)
2	Murugesan	H	M	9	A P M with flail foot	18- 2-38	Do
3	Ponnayya	H	M	5	A P M Flail foot	23- 2-38	Do
4	Ramatiagam	H	M	8	A P M Flail foot	14- 3-38	Triple arthrodesis and Bone blocking
5	Murugesan	H	M	9	A P M Flail foot	18- 4-38	Supra-condylar osteotomy
6	Jayalakshmi	H	F	15	A P M foot drop	18- 5-38	Triple Arthrodesis
7	Tangavelu	H	M	8	A P M	3- 6-38	Triple Arthrodesis both feet
8	Subba Rao	H	M	13	A P M	6- 6-38	Tenotomy (Souther's operation)
9	Pondy Das	H	M	12	A P M Talipes both feet	20- 7-38	Triple arthrodesis
10	Kannamma	H	F	12	A P M	14- 9-38	Triple Arthrodesis
11	Jayalakshmi	H	F	12	A P M Drop foot	7-10-38	Triple Arthrodesis (Dunn)
12	Jayammal	H	F	8	A P M	28-10-38	Triple Arthrodesis
13	Jayalakshmi	H	F	12	A P M	11-11-38	Supra condylar osteotomy, right side
14	Dhanalakshmi	H	F	15	A P M Flail foot with Genuvalgum	13- 2-39	Bilateral triple arthrodesis
15	Rajalakshmi	H	F	6	A P M with flail foot	7- 4-39	Triple Arthrodesis
16	Padma	H	F	5	A P M with flail ft	10- 4-39	Do
17	Suryaprakash Rao	H	M	15	Do	21- 4-39	Do
18	Teipamma	H	F	6	A P M.	9- 6-39	Triple Arthrodesis on both sides
19	Ghouse Mohideen Khan	M	M	10	A P M. right foot	12- 6-39	Triple Arthrodesis with backward displacement was done
20	Kannayya	H	M	12	A P M Left lower limb	20- 7-39	Triple arthrodesis
21	Rajamba	H	F	5	A P M Flail foot	24- 7-39	Do
22	Anasuyammal	H	F	8	A P M lower limbs with flail feet	12-10-39	Do
23	Subbarayan	H	M	6	A P M Bilateral foot drop	5- 4-40	Bilateral arthrodesis
24	Ramanathan	H	M	20	A P M Rt lower limb (15 years)	20- 5-40	Triple Arthrodesis
25	Pattu	H	M	7	A P M left lower limb	20- 5-40	Do
26	Kesava Rao	H	M	12	Residual A P M left	21- 6-40	Do
27	Satyavathi	H	F	13	T E V residual Rt foot with shortening of leg due to A P M	10- 1-41	Do
28	Natarajan	H	M	7	A P M	16- 7-41	Do
29	Lakshmi	H	F	18	A P M	22- 8-41	Do
30	Gotuku Kamalam	H	F	13	A P M and T E V Left	3-11-41	Do
31	Miss B	E	F	15	Flail foot with Scoliosis	- 1-41	Do.

# **"OBSERVATIONS ON THE EPIPHYSEAL CENTRES AT THE LOWER END OF THE HUMERUS IN SOUTH INDIAN CHILDREN"**

BY

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AND

DR BHASKARAMURTHI, MBBS

The following table gives the results of a radiographic study of the ossifications of the lower end of the humerus in 495 children seen for injuries of the elbow at the Orthopaedic Department of the Madras General Hospital

**STATEMENT SHOWING THE NUMBER OF CASES SEEN IN EACH  
AGE GROUP AND THE APPEARANCE OF THE CENTRES OF  
OSSIFICATION IN EITHER SEX**

Age of the patient	Total Number at the age	Capitellar epiphysis present		Medial epicondyle epiphysis present				Trochlear epiphysis present				Lateral epicondyle epiphysis present			
		Male	Female	Total number	Male	Female	%	Total number	Male	Female	%	Total number	Male	Female	%
1½	1	—	1												
1	2	2	—												
1½	4	3	1												
2	13	7	4												
3	52	30	22	2	—	2	4%								
4	49	28	21	5	2	3	10%								
5	57	33	24	14	9	5	25%								
6	53	29	24	24	12	12	45%								
7	44	36	8	26	20	6	56%								
8	52	41	11	49	38	11	98%								
9	20	14	6	18	11	4	90%	4	1	3	20%	4	3	1	20%
10	57	52	5	52	47	5	98%	13	11	2	25%	4	3	1	7%
11	22	19	3	22	19	3	100%	12	10	2	55%	4	2	2	20%
12	45	40	5	45	40	5	100%	25	22	3	51%	8	6	2	18%
13	18	18	0	18	18	0	100%	18	18	0	100%	4	4	0	22%
14	17	17	0	17	17	0	100%	17	17	0	100%	9	9	0	53%

The ages of ossification given in text books are

	Capitellum and lateral half of trochlea	Medial epicondyle	Medial part of trochlea	Lateral epicondyle
Jamieson's Companion to manuals of practical anatomy	1—2 years	5 Females and 8 Males	10	14
Gray	End of 2nd year	5	12	13 or 14
Buchanan	3	5	12	14
McGregor	3	5	12	12
Bathe Rawlings	2	5	12	13
Hosford's fractures	End of 2nd year	4	11 or 12	13
Appearance at the earliest in South Indian children	At the end of 1st year	3	9	9

The centre of ossification of the capitellum appears towards the end of first year. It has been observed in a child aged 8 months. It appears earlier in male children.

At the age of three years 4 per cent of cases showed the centre of ossification in the medial epicondyle and in 94 per cent of cases the centre was present at the age of eight. The centre appears earlier in male children. The centre for the medial part of the trochlea is observed at the earliest in 20 per cent of cases in children aged nine and at the age of thirteen 100 per cent of cases showed it.

The centre for the lateral epicondyle in 5 per cent of cases appear at the age of nine and at the age of fourteen 53 per cent of cases showed it.

### Conclusion

The age of appearance of secondary centres in the lower end of the humerus may be stated to be as follows in Madras—

Capitellum	1 to 3 years
Medial epicondyle	3 to 11 years
Trochlea	9 to 13 years
Lateral epicondyle	9 to 14 years

These are ages for South Indian Children. One therefore ought to be very guarded in fixing the age of a child in medico-legal work. The work requires to be amplified in its scope of application by having recourse to skiagrams of other joints. By working out the variation of ossification ages at other joints a more reliable criterion for fixing the age of a child might be postulated.

We are obliged to the Superintendent, General Hospital for permission to use the hospital records.

# ON FRACTURE OF HEAD OF FEMUR WITH REPORT OF A CASE

BY

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Fracture of the head of the femur either alone or associated with other fractures is exceedingly rare Christopher was able to collect only fourteen cases from the literature till 1926 and added one of his own A survey of the literature shows the rarity of such cases and the pathology and mechanism still remains to be explained correctly

I add a case that came under my care in 1938, and some observations on the possible pathology and mechanism of such fractures

## CASE REPORT

R well built, adult male, muscular, about thirty years of age was admitted to the K R Hospital, Mysore, on 7-7-1938, for pain and disability of the right hip 15 days before, while he was sitting on top of grain sacks in a loaded country cart, the cart cap-sized, and he was thrown down, and the grain sacks piled on top of him At that time

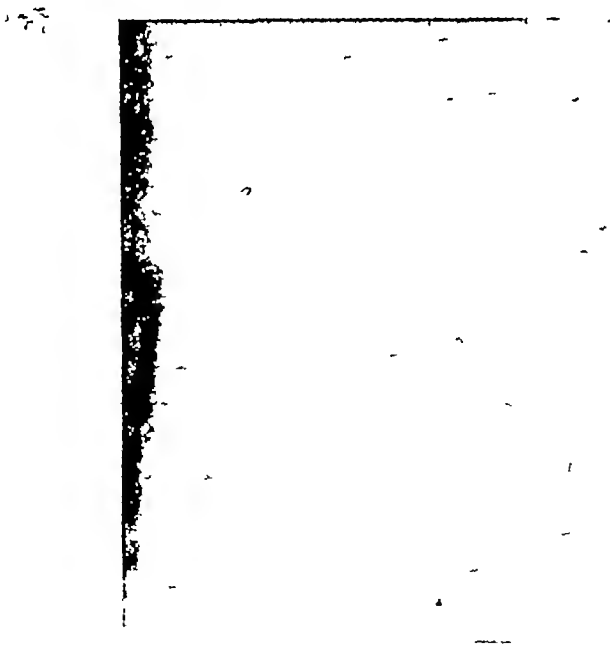


Fig 16 Showing fracture of head & dorsal dislocation (7-7-38)

he remembers that he was in a bent and crouched attitude, and the sacks fell on his back and loins He did not lose consciousness, but had intense pain in the right hip and lower extremity, and was unable to move them He was removed to his home town,

where he had treatment from a neighbour, but the pain and disability grew worse, and so sought admission to the hospital, a distance of thirty miles

On clinical examination, there is a real shortening of  $1\frac{1}{2}$  inches, the limb being in a position of flexion adduction and internal rotation. Acute tenderness over the region of the hip joint both in front and behind. No bruise visible. A rough grating noise is heard when the femur is moved. A dorsal dislocation of the hip was diagnosed clinically. No other injury on his body was found.

Roentgenological examination showed that a portion of the head of the femur, about half the spherical portion, had fractured, the line of fracture being nearly parallel to the contour of the head itself, the smaller fragment lying in the acetabular cavity and rotated, so that the articular area was directed downwards and anteriorly (Fig 16). The larger fragment containing portion of the head was outside the acetabulum on the dorsum illi. A diagnosis of the fracture of the head of the femur with dorsal dislocation of the distal fragment was made.

*Treatment*—Manual attempt at reduction of the dislocated fragment, was made under spinal anaesthesia (Planocaine 1% 7 cc). Great difficulty was experienced on account of the heavy limb, and the presence of a portion of the head inside the hip joint. A click was heard, when the dislocation was thought to have been reduced, but a roentgenogram revealed a transverse fracture of the neck of the femur at the site of usual subcapital fracture, the distal portion of the femoral head being still outside the acetabular cavity (Fig 17).

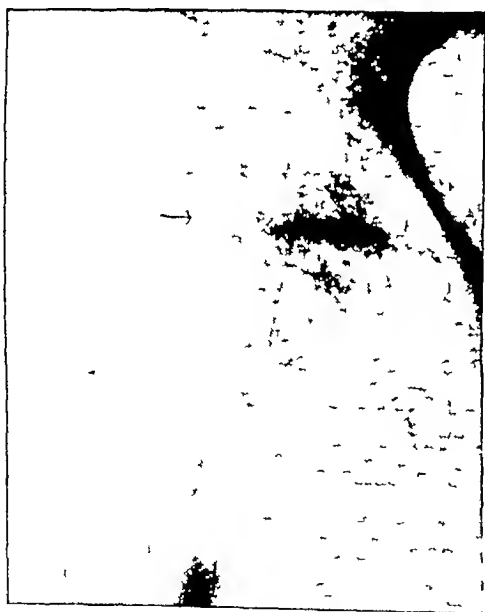


Fig 17 Shows fracture of neck (arrow) and head with dislocation 9-7-38



Fig 18 Showing Callus formation 23-7-38

The fracture now consisted of three fragments, viz, (a) a piece of the head, (b) a part of head and neck, and (c) a part of the neck and upper end of femur. Operative reposition of the neck was considered, and as the patient was unwilling for any operation, traction with Kirschner wire passed through the condyles of the femur

was employed (13-7-38, a weight of 12 lbs was used at first and increased to 18 lbs on 25-7-38)

Check roentegenograms taken at intervals showed no marked change, and a large amount of callus began to form. The wire was removed on 9-8-38 and patient was discharged from the hospital at his own request on 10-8-38. At the time of discharge, he had pain and disability at the hip, no movement at the hip joint, and could only limp a few steps with the aid of a crutch. The real shortening persisted.

The patient was lost sight of for a considerable period, but was traced in the month of August 1940. A communication from the local doctor at that time informed me that the patient was walking about with the aid of a stick, and was able to attend to farming, his means of livelihood, without much handicap.

I have made many attempts to induce him to present himself but due to various reasons he has been unable to come and see me.

*Anatomy*—A short survey of the anatomy of the head and neck would not be out of place before going into the mechanism of the fracture itself.

The head is developed as a separate ossific centre and appears about the first year of life. The fusion of the head epiphysis with the neck occurs at about 18 years, a little earlier in women. It is about  $\frac{2}{3}$  of a sphere, and the epiphyseal line practically corresponds with the edge of the articular surface. The head is larger in males. The greater part of the spherical head is received into the cavity of the acetabulum, deepened by the fibro-cartilaginous cotyloid lig, and the fibrous transverse ligament. The lig teres is a weak synovial attachment to the head of the femur to the cotyloid fossa and transverse ligament. It is the remains of a primitive capsule, and has little mechanical value, but carries some small vessels and nerves to the head of the bone. The ligamentum teres is not a strong ligament and ruptures at 14 Kgm.

The head consists of purely cancellous bone with a rim or covering of compact bone. There are condensations of the cancellous part of the bone giving rise to lamellae. These lamellae are arranged spirally, in the plane of the shaft wall giving the appearance of arcades on section, starting from the neck and continued into the dense cancellous bone of the head. In a coronal section of the head and neck, we note that the under surface of the neck is formed by a layer of compact bone of considerable thickness, continuous below with inner wall of the shaft, ending above in numerous cancelli passing to the head. From its upper convex aspect most of the 'pressure lamellae' rise, which radiate to the great trochanter, to the upper surface of the neck, and especially to the head, and which are crossed and bound together by the 'tension lamellae' from the outer wall of the shaft and upper boundary of the section. More than half of the width of the head is seen to project inwards beyond the extremity of this strut. It must be noted that, with the toes turned out as is usual in lying and standing, the neck

slopes markedly backwards and the great trochanter lies in a plane decidedly posterior to that of the head

*Mechanism*—In this case the mechanism could only be surmised. The history indicates that at the moment of fracture, he was in a flexed and crouched attitude. In this position of flexion of the hip to nearly 90 degrees, the impact on the back and loins must have driven the edge of the acetabulum, the posterior superior edge (the suprafemoral buttress—described by Putti, as a very stable and important factor in the prevention of C D H, possibly of recurrent dislocation of the hip in traumatic cases as well) must have acted as a cutting force on the spherical head. In this position of flexion of the hip the head is in close contact with the posterior aspect of the acetabulum, and the inferior extremity being anchored on the cart, the head has been cut into two. By analogy, when a coconut struck against a sharp edge it splits into two, in the axis of the sharp edge and at right angles to the direction of motive force. Conversely it can also be split into two by a sharp instrument. This might give an insight into the possible way that the hard head of the femur may be split by the sudden impact either of the head on the acetabular rim, or of the acetabular rim on the head itself. With diminution in the size of the head, and the direction of force acting in such a way that the lower end of the fragment continues to impinge on the postero-superior aspect of the hip, the weakest part, the ilio-femoral ligament acting as a fulcrum, it is easy to see how a dislocation of the distal part of the head with the upper end can occur, with or without associated fracture of the acetabular rim. That the fracture occurs first and later the dislocation, is also proved by the fact, that the smaller piece of the head remains in the joint cavity, and the larger fragment is dislocated. That the acetabular rim should be fractured is more surprising, as that being the implement of violence should also give way. It is possible that the force is so great as to cause the rim as well, to break. It will be seen in the survey of the literature that it is not always necessary to find either a dislocation or a fracture of the acetabular rim (Reidal, Crile, Roberts)

It is not necessary that the head should fracture always by the same mechanism. It is possible that when a violent direct force is applied to the trochanteric area, resulting in a fracture of the neck of the femur, the neck, due to the continuation of the force may actually split the head open. That such a mechanism is possible is seen in a case report of Robert's in 1896, of a man aged 25, who was caught between the bumpers of two railroad cars. He sustained a fracture of the head and neck of femur with the acetabulum, and dorsal dislocation of the femur.

The line of cleavage of the head naturally depends upon many factors. The fracturing force itself as indicated before, may be of diverse varieties. But, certain anatomical factors contribute in aligning the line of fracture along particular lines. These are principally (a) the pressure lamellae being

arranged spirally in the head, (b) the attachment of the ligamentum teres to the fovea centralis

Though these factors are of importance it is not possible to indicate what direction each fracture will take, but an examination of the lines of fracture of the cases surveyed by Christopher in 1926, suggests that the head usually breaks in the sagittal plane in such a way, that the smaller fragment has usually the ligamentum teres attached to it (cases of Levin, Satta, Reidel Christopher, etc.) The plane of this line of fracture nearly corresponds with the plane of the acetabular rim

Considering that the narrow part of the neck, *i.e.*, the place where the vertical diameter of the neck is equal to the antero-posterior diameter, is the most vulnerable part in the upper end of the femur, and also that the spherical head is well protected by the depth of the acetabulum, the cotyloid ligament and a dense capsule, which in its turn is covered by thick and powerful muscles, it is surprising that fractures of the head should occur at all. A number of pre-disposing factors suggest themselves *viz*

- (a) Laxity of the capsules,
- (b) Long ligamentum teres,
- (c) Unusually thick posterior rim of acetabulum,
- (d) Pathological bone condition, either local or general

A survey of the few cases does not show any reason to conclude that any of the above existed

Peculiarly enough, in no case is there a mention of the fracture of the floor of the acetabulum. From the enormous violence necessary for a fracture of the head, one would have thought that the floor of the acetabulum would give way, giving rise to a central dislocation of the hip, a not so uncommon condition. Therefore it is possible that the floor of the acetabulum is unusually thick, and the violence which would have ordinarily caused a central dislocation of the hip would now cause a fracture of the head. The posterior dislocation as mentioned before, is purely a secondary factor aided by the changed anatomy and size relationships of the head and acetabulum

In the case under report, certain peculiar features present themselves. The condition was not thought of till a Roentgenological examination was made. The attempted reduction of the dislocated fragment was extremely difficult and was attempted under successful spinal anaesthesia (planocaine) but was a failure and in addition the neck of the femur gave way. The Roentgenograms do not show any anatomical abnormality of either the suprafemoral buttress, the floor of the acetabulum or of any part, though the difficulty of reducing a smaller head would suggest a prominent acetabular ridge preventing reduction

Fracture of the neck associated with that of the head can occur as seen in a case reported by Roberts. In this case apart from the injury to the head, there is no other injury to the person, whereas in practically all the cases reviewed by Christopher there have been other associated injuries (Reidel) and in some cases, so severe as to cause death immediately or soon after (Birkett, Crile, Braun, Roberts, etc.)

Subsequent radiograms taken at intervals show the dislocation, and the fractured pieces covered by a large amount of callus, thereby negating any view, that the fracture of the head was possibly due to deficient blood supply.

In conclusion my thanks are due to Mr C P V Menon of Madras and to my teacher Dr S R Moolgavkar of Bombay for the help given to me in the publication of this paper.

### RESUME

- (1) A case of fracture of the head of the femur is recorded
- (2) The anatomical and mechanical factors causing such a fracture is discussed
- (3) The thick posterior rim, with possibly a stout acetabular floor are factors in producing such a fracture
- (4) The resulting function is poor
- (5) A few cases mentioned by Christopher has been reviewed

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# PRIMARY CARCINOMA OF THE MALE URETHRA WITH REPORT OF A CASE

BY

U MOHAN RAU, M S, F R C S

This is a comparatively rare disease. The first acceptable case was that of Hutchinson, which was presented to the London Pathological Society in 1861. Upto the end of 1938, Young has collected 145 authentic cases.

## *Etiology*

(1) Inflammatory irritation causing metaplastic changes in epithelial surfaces has been cited as the principal etiological factor by numerous writers. Thiersch was the first to call attention to malignant transition of cicatrized areas in stricture of the urethra and to report a case of squamous cell carcinoma developing in a case of longstanding stricture. Leukoplakic changes from chronic urethritis behind pathological strictures have been described. Urethral strictures are present in about 50% of cases of carcinoma of the urethra.

It must be noted that carcinoma may produce symptoms of stricture early in its course and lead to an erroneous diagnosis.

(ii) Other authors have reported cases in which carcinoma followed traumatism, generally to the perineal urethra.

(iii) Kretschmer believed that the majority of carcinomata arose from pre-existing benign papilloma.

*Age*—This disease is rare before 40 years, it occurs chiefly between 50 and 60 years. Paton described it in a youth of 18, and Kroiss described a case in a man aged 91 years.

## *Pathology*

(1) *Site*—Though no portion of the urethra is exempt from this growth, the bulbous urethra is the seat of the growth in the majority of cases. The penile urethra is less frequently affected and the prostatic urethra is very rarely affected.

(ii) *Local Extension*—It is characteristic of these growths to produce an obstruction of the urethral lumen by circumferential constriction or by pedunculated masses. The growth extends along the urethral mucous membrane and then invades the corpus spongiosum. It seldom extends beyond the triangular ligament into the prostatic urethra, but extension can take place from the bulb to the penile part and *vice versa*.

The urethra behind the obstruction becomes dilated and then encrusted with phosphates, fistulae, communicating with the surface are often present, especially in those cases where a stricture has been pre-existing

(iii) *Histology*—The normal urethra is lined by squamous epithelium up to the fossa navicularis, with columnar epithelium up to the prostatic urethra, and with transitional epithelium in the prostatic urethra

Robb classified urethral carcinomata as follows

- 1 Squamous cell carcinoma—73%
- 2 Adeno-carcinoma—21%
- 3 Papillary carcinoma—3.5%
- 4 Columnar cell carcinoma—1.5%
- 5 Transitional cell carcinoma—1.3%

All authors are agreed that the squamous cell carcinoma is by far the most frequent. It presents the usual appearances including the "epithelial pearl" formation. In the commonest site for the carcinoma, the bulbar portion, these carcinomata probably arise by a process of metaplasia of the normal columnar epithelium.

When adeno-carcinomata are found, the origin is thought to have been from Cowper's glands in most cases, but it is admitted that a true adeno-carcinoma might begin in other periurethral glands, although this is apparently extremely rare.

The other varieties of carcinoma are very rare.

(iv) *Metastases*—In a study made by Young and Davis, it was stated that "metastases in epithelioma of the urethra are usually late." Regional metastasis is to the iliac or inguinal nodes or both. *If the growth is posterior to the suspensory ligament of the penis*, there is little chance of metastases to inguinal nodes. The external iliac, hypogastric and sacral groups of lymph glands may be involved. *If the growth is in the pendulous urethra*, metastases to the inguinal glands may be found, so that most authors are agreed that if amputation of the penis is done, removal of the inguinal nodes, preferably a block dissection, along with the penis, should be carried out.

Very rarely metastases have been described in the lungs, liver, testes, ribs and vertebrae.

*Symptoms*—The disease may manifest itself as an increasing difficulty in micturition, which may be of a long-standing nature, especially in cases due to a pre-existing stricture. In others, a patient in apparently good health may come in with an attack of acute retention of urine.

*Haemorrhage*, either as a bloody discharge at the meatus or as haematuria, either spontaneously, or after instrumentation, may be present. *Pain and urethral discharge* are less frequently noted. A palpable tumour appears in the perineum in some cases. *Peri-urethral abscess* and later still, *urethral fistulae* may form.

In the penile portion, in addition to the above symptoms, the tumour is felt as a hard induration in the urethral canal. Later corpus spongiosum and corpora cavernosa are infiltrated, ventral curvature of the penis may occur during erection. The penis becomes swollen and rounded at the part. If the growth is in the terminal part, a club shaped swelling forms.

### *Treatment of the Primary Growth*

#### *(A) Operative treatment*

(i) Early radical operation is recognised as of prime importance, when the lower penile urethra alone is involved. Amputation of the penis with block dissection of inguinal glands is the accepted procedure.

(ii) For carcinoma further up the urethra (high penile and bulbar), complete removal of the penis and bulbar urethra, with transplantation of the posterior portion into the perineum has given the best results.

For these cases, Young has described a new method. In this, the urethra and the 3 corpora are divided anteriorly at the peno-scrotal junction and posteriorly close to the membranous urethra. The great defect produced by this extensive removal of the urethra and the three corpora, has been closed by pulling back (telescoping) the penis and anastomosing it to the stump of the bulbous urethra near the triangular ligament.

It has been suggested that this operation might also be applied satisfactorily to urethral carcinoma of the scrotal and upper penile portions, and thus perineal transplantation of the stump of the urethra and loss of penis avoided.

(iii) Other operative methods of treatment suggested are Suprapubic cystotomy, resection of the urethra and growth, fulguration, passage of sounds, and the use of an indwelling catheter. These procedures seem to be more palliative than curative.

*Prognosis*—Growths in the anterior portion of the urethra give gratifying end results, whereas carcinoma of the posterior part possesses a gloomy picture. In one series of 78 cases of carcinoma of the posterior urethra, only 14 3% recovered.

#### *(B) Irradiation treatment*

(i) For growths near the external urinary meatus, that ulcerate on the surface of the glans penis, Chaoul's therapy gives the best results.

(ii) For carcinomata in the penile portion of the urethra, irradiation by means of Radium needles incorporated in a mould yields good results. The mould is made around the penis and the needles so incorporated in it, that the ventral aspect of the penis (and thus the urethra) is irradiated.

Interstitial implantation of Radium needles into the growth is not to be advocated, as the resulting fibrosis is so severe, that subsequent erections are agonisingly painful.

(iii) For carcinoma in the bulbous urethra, peri-urethral implantation of Radium needles, by the perineal route, with the needles lying parallel to the urethra is advocated.

Penetration of the urethra during implantation of the needles should be carefully avoided.

In the absence of facilities for Radium treatment or in cases where there is a residual growth after primary irradiation with Radium, *deep x-ray therapy* may be carried out, to complete the treatment.

#### *Treatment of the Lymphatic Glands draining the Carcinomatous area*

##### *Inguinal glands*

(i) If they are not palpable clinically, a prophylactic irradiation with deep x-ray therapy is best.

(ii) If the glands are palpable but movable and not fixed to surrounding structures, then block dissection of these glands is very satisfactory. Some authorities advocate a course of pre-and post-operative irradiation in addition to block dissection.

(iii) If the glands are enlarged and fixed to surrounding structures, then only irradiation treatment may give relief.

The iliac group of glands are best treated by irradiation.

#### CASE REPORT

Venkatasubbiah, male, aged 44, was admitted into Dr Māngesh Rao's Ward on 4-9-40.

His complaint was that urine was constantly dribbling out of the external urinary meatus.

*Past and Present history*—He gives a history of gonococcal urethritis about 8 years ago. This was treated by some Ayurvedic Physician. About 4 years ago, i.e., about 4 years after the original Neisserian infection, the patient noticed that his urinary stream was narrower than before. This narrowing of the urinary stream gradually progressed until about 2 years ago, when the stream became so narrow and he had to strain so much that he got his urethra dilated at the Government Hospital, Nellore. This dilata-

tion gave him only a temporary relief. The narrowing of the urinary stream returned a few months later. Soon afterwards he noticed that instead of difficulty due to narrowing of the stream, the urine started dribbling out of his external urinary meatus. This condition has been continuing for the last 18 months.

At no time except for the gonorrheal infection 8 years back, has the patient noticed any blood or pus or any calculus in his urine. There was no history either of any sudden obstruction to his urinary flow or of renal colic.

There were no symptoms referable to the nervous system.

On examination, it was found that urine was dropping out of his urethra in an almost continuous drip. It was clear and was not blood-stained. Straining slightly increased the rate of flow of the urine. There was no abnormality in the penile urethra. No abnormality could be clinically made out in the bulbous portion of the urethra.

Examination of his abdomen did not reveal any distended bladder. There was nothing else abnormal in the abdomen. Clinically it was a case of true incontinence.

Nervous system	}	Clinically nothing abnormal
Other systems		
Rectal examination		

It was unsuccessfully attempted to pass into the bladder a rubber catheter, a metal catheter and a metal sound in turn, a diagnosis of *impassable urethral stricture* was then made and an external urethrotomy was decided upon. The cause of incontinence was still in doubt.

On 9-9-40<sup>11</sup>, external urethrotomy was performed. On incising down to the urethra, a cartilaginous nodule was felt in the posterior part of the left side of the bulbous urethra and the membranous urethra. On cutting into this, the naked eye appearance



Fig 19 Photomicrograph of section showing typical squamous celled carcinoma

was very suggestive of a fibroma. This was excised together with a portion of the floor of the urethra. The passing of a catheter then revealed that the narrowing was extending proximally up to the entry of the catheter into the bladder, i.e., up to probably the

internal urinary meatus This narrowing was thought to be due to the fibroma of the urethra in the proximal portion of the urethra left behind, it was dilated, a catheter was passed through the external meatus, across the perineal wound into the bladder and was fixed to the penis in position The external urethrotomy wound was stitched up The bladder was drained continuously

On 15-9-40, the Pathologist reported that the specimen sent was squamous cell carcinoma and not a fibroma (Fig 19)

So on 21-9-40, on the advice of the Radiologist, we implanted 30 mgms of Radium all around the membranous and prostatic urethra, through the perineal route A total dosage of 4,320 mgm hrs, was given All through this period, the patient was having an indwelling catheter, which was frequently being changed

On 27-9-40, the needles were removed.

A week after the irradiations were stopped, the indwelling catheter was removed

6-10-40 The patient is now having control over micturition and is able to retain the urine in his bladder for about 4 hours

On 31-10-40 Urethroscopy was done, these are the findings

Fibrous urethral stricture over the area excised (This had to be dilated to allow the passage of the urethroscope into the posterior urethra) External urethral sphincter was rigid The mucous membrane of the membranous and prostatic urethra was thrown into irregular folds by polypoidal projections into the lumen One large sessile projection into the membranous urethra was present on the left side A fair sized polypoid projection with a whitish slough on its surface was projecting into the internal urinary meatus

*Rectal Examination* done now shows dense induration in the irradiated area

As the urethroscopic appearances show that a portion of the growth is present, it was decided to give a course of deep x-ray therapy to the posterior urethra through the perineal route But after only 4 exposures, the patient insisted on going home and was discharged

1-1-41 He was re-admitted with the complaint that he had very occasional incontinence of urine He was otherwise feeling normal

On 4-1-41 Cysto-urethroscopy revealed a pedunculated growth on the floor of the urethra, on the vesical side of the *veru montanum* The rest of the urethra was normal

A portion of the growth, near the vesical neck, was resected with McCarthy's resectotome The rest of the growth was burnt away with Diathermy, using a Geringer's urethroscope

A rubber catheter was tied into the urethra This was removed 8 days later and on 16-1-41, the patient was discharged at his own request

On 18-6-41, he was re-admitted He was feeling quite fit and had no complaints Cysto-urethroscopy did not show any evidence of the growth A mild stricture at the site of the excision of the growth was dilated

On 10-11-41 The patient was seen as an O.P He was quite well clinically and refused to be admitted No evidence of any metastasis

*Noteworthy features of the case are*

- 1 The probable existence of a stricture of the urethra before the onset of carcinoma Stricture is said to precede carcinoma in about 50% of cases
- 2 The difficulty of radical surgical treatment owing to the anatomical situation of the growth
- 3 The good response to surgery combined with irradiation, the patient gaining control over micturition
- 4 True incontinence, as a symptom of carcinoma of the urethra, has not been mentioned in the literature so far This incontinence was probably due to the polypoidal projection into the internal urinary meatus, which must have been much bigger before irradiation

My thanks are due to Lt-Col McRobert, M D, F R C P, I M S, Superintendent, General Hospital, for permission to publish the case report, and to Dr N Mangesh Rao, M B, C M, F R C S E, D L O, Surgeon, General Hospital and Dr K M Rai, M B, F R C S E, D M R (Eng), Radiologist, Bernard Institute of Radiology for valuable help in preparing this article

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# A CASE OF TRACHEOCELE

BY

P K DEVI, M B B S, GENERAL HOSPITAL, MADRAS

Cystic tumours of the neck communicating with the lumen of the trachea directly and containing air have been reported in the literature and are considered sufficiently rare to justify a report of the following case —

## CASE REPORT

*History* —The patient, an intelligent woman of 35 years of age was admitted into the General Hospital, Madras, on 2nd April, 1942 for a tumour on the right side of the neck causing inconvenience to breathing and swallowing



Fig 20 Photographs of patient showing the condition on admission

She stated that she noticed a transverse swelling in the neck when she had an attack of slight fever with cough four years back. At the time she had also great difficulty in breathing and swallowing and she could not speak for nearly ten days, after which the fever subsided and the swelling was hardly noticeable. A year later the swelling began increasing in size and the patient consulted a doctor who advised operation. The operation was performed under local anaesthesia and the patient stated that the tumour burst spontaneously with an explosive sound and then collapsed completely leaving a small wound about an inch in length. The patient did not notice that anything escaped and the wound healed satisfactorily. She had no further trouble till four months before admission when she noticed that the swelling appeared again at the same spot and began increasing in size rapidly but painlessly up to the time of admission.

*On Examination*—General condition good Temperature, Blood Pressure and Pulse rate normal Heart and lungs normal There was a lobulated swelling, mainly in the anterior triangle on the right side of the neck extending to just beyond the midline in front and a little way behind the sternomastoid posteriorly and from the level of the hyoid bone above to the first rib below (Fig 20)

There was a transverse scar about an inch in length in the upper part of the swelling where the skin appeared very tense and stretched No pulsations or dilated veins visible The margins of the swelling were fairly well-defined There was fluctuation felt in some parts and the swelling had, on the whole, a soft and elastic consistency There was no movement on deglutition or protrusion of the tongue, movement of the swelling being fairly free in the transverse direction but very limited in the vertical direction On percussion the note was tympanitic throughout the swelling and there was a definite impulse felt on coughing Respiratory sounds were audible on deep breathing

*X-Ray Examination* showed a large air-containing sac communicating with the Trachea at the level of the 5th cervical vertebra and deviation of the trachea to the left side (Figs 21 and 22)

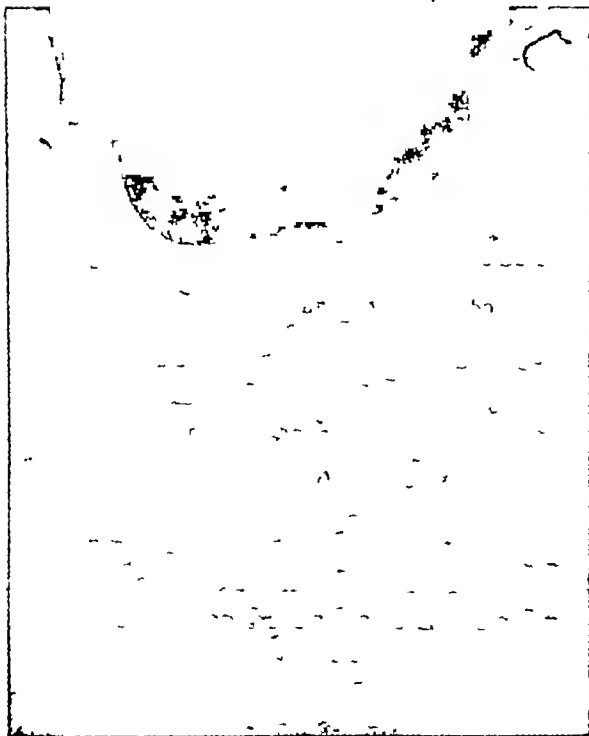


Fig 21 A/P Skiagram of neck showing the large air-containing tumour and deviation of trachea to the left



Fig 22 Lateral view of the same showing communication with trachea indicated by arrow

*Operation*—On 4-4-'42 under general anaesthesia with a Collar incision through the skin. The sac of the tracheocele was deep to the sternomastoid which was stretched over it. The sternomastoid was divided close to its attachment to the sternum. While the sac was being separated it tore and showed a mucous lined cavity containing air and a little mucus. The wall of the cavity was dissected off from where it was adherent over a wide area extending from the level of the thyroid cartilage to just behind the sternum, medially just across the middle line and laterally beyond the carotid sheath. When it was dissected out, it was found that it was communicating with the trachea through a track about  $\frac{1}{2}$ " across behind the pretracheal muscles. The track appeared to be valvular as there was very little air escaping. It was divided, closed by two layers of sutures and a drain was led out from near the suture line. The wound was insufflated with sulpho-namide powder and closed. The skin sutures were removed on the fifth day and the drain on the sixth day after operation. Recovery was uneventful except for a slight rise of temperature on the second day and slight cough for the first three days after operation (Figs 23 (a) and (b) show skiagrams taken after operation).

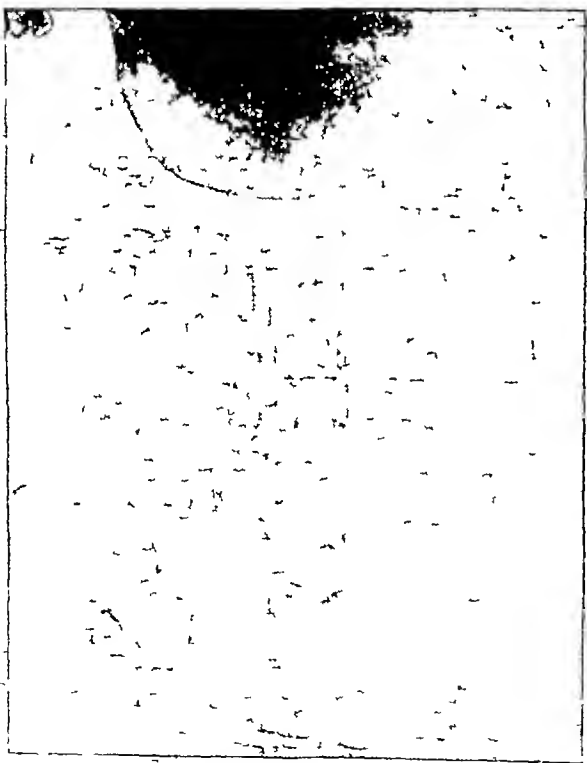


Fig 23 (a)



Fig 23 (b)

*Histological Examination* of the sac wall showed a lining of ciliated columnar epithelium but there was no evidence of cartilaginous tissue in the different sections examined.

*Discussion*—The interest in this case lies primarily in its rarity. It is generally recognised that tracheoceles are air-containing diverticula arising from a weak spot on the tracheal wall either due to congenital defects or pathological causes such as inflammatory changes including syphilitic or tuberculous disease or due to traumatic rupture. In those due to weakness of the wall, the sac is lined with tracheal mucous membrane whereas those due to rupture should be considered as new formations. The cyst contains air chiefly sometimes mixed with a little mucus. The tumour is generally painless and sometimes causes inconvenience in breathing or swallowing, but dyspnoea and attacks of suffocation are rare. It is resonant on percussion and the size may increase noticeably on forced expiration and diminish on inspiration and the swelling when small can be reduced by pressure. The diagnosis is easy and the prognosis depends on the cause, being favourable if the original cause is not serious. As regards treatment surgical interference is supposed to produce a worse condition than the disease and recurrence is very common. The case reported above probably resulted from inflammatory weakening of the wall of the trachea as a result of tracheitis accompanying the original attack of fever and cough. Excision of the sac and the valvular communication was attempted due to the large size of the swelling and the inconvenience to breathing and swallowing resulting therefrom and up to the time of writing this report, there has been no sign of recurrence.

I am indebted to my chief Dr C P V Menon under whom the case was admitted and to the Superintendent, General Hospital, Madrás, for permission to report this case.

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The attention of all Members is particularly invited to the circular letter, regarding the Library of the Association, sent along with the December Issue of the Journal. Some generous contributions have already been promised. It is hoped further contributions in money and books will come in in the immediate future.

\* \* \* \* \*

*Annual Meeting* There is a proposal that the Meeting which has been fixed for February, 1943 at Hyderabad, should be postponed. A number of Members of the Governing Body including the President are in favour of this postponement. Members are requested to express their views on the matter to the Secretary at an early date, so that a decision can be arrived at.

\* \* \* \* \*

## SUBJECTS FOR DISCUSSION

### 5th Meeting, Feb 1943

- 1 Laryngeal Carcinoma by Dr H D Gandhi and Dr S G Joshi, Bombay.
- 2 Injuries of the Thorax by Dr C S Patel, Bombay
- 3 Surgery of the Gall Bladder

### 6th Meeting, 1944

- 1 Traumatic Surgery of the Skull by Dr R N Cooper, Bombay
- 2 Carcinoma of the Breast by Dr N C Joshie, Delhi
- 3 Urinary Lithiasis by Dr L B Joshi, Karachi

### 7th Meeting, 1945

- 1 Carcinoma of Rectum by Dr C P V Menon
- 2 Enlarged Prostate by Dr S R Moolgavkar
- 3 Fractures of the neck of the Femur by Dr B N Sinha

### 8th Meeting, 1946

- 1 Carcinoma of the Cheek by Dr B M Joly
- 2 Tuberculous disease of the Spine by Dr S P Srivastava
- 3 Hare Lip and Cleft Palate by Dr S C Sinha



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# THE INDIAN JOURNAL OF SURGERY

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## UNILATERAL FUSED KIDNEY

BY

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### Introduction

Kidney anomalies are said to be rare and before pyelography came into vogue, they were of academic interest, usually discovered in dissection-room subjects or during autopsy. It is said that vague pains of kidney origin are often caused by malformed kidneys, though, in a number of cases, they are of the silent type. Urologists therefore must always keep in mind the possibility of congenital abnormalities of the kidneys and the ureters, in investigating cases of renal trouble. The case recorded herein is sufficiently rare to merit its publication.

### Case Report

The present specimen was found in a female subject aged about 35 years, during routine dissections by the students. We have no record of the clinical history referring to the kidney functions as the body was of an unclaimed beggar woman found dead on the streets. The gross appearance of the kidney and the ureters does not suggest that she suffered during life from kidney trouble. Most probably it was one of the silent type.

The kidney is single and is situated mainly to the left side of the body and is retro-peritoneal. Its vertical extent is from the second to the middle of the 5th lumbar vertebrae. It measures  $6\frac{1}{2}$ " in its long axis and 3" in its maximum transverse diameter.

It is roughly of 'J' shape with the long axis obliquely directed downwards and to the right. It is concavo-convex in outline, being moulded on the vertebral column and the left para-vertebral gutter. The nerves of the lumbar plexus, the left psoas and the left quadratus lumborum muscles, the

aorta and its bifurcation, the presacral nerve and the left sympathetic chain are lying dorsal to the kidney mass (Fig 1)



Fig. 1 Photo of the unilateral fused kidney mass with the two ventral pelves two ureters and multiple vessels

The ventral surface is lobulated by the presence of deep grooves in some of which lie the blood vessels. This gives an impression that this lobulation is partly due to the persisting foetal condition and partly mechanical due to pressure from the vessels. The grooves begin as notches on the margins and they converge towards two shallow depression on the ventral surface which are evidently the two renal sinuses and from which emerge the renal calyces. The medial margin is irregular and deeply indented by 5 notches. The lateral border is convex and it also presents 4 notches.

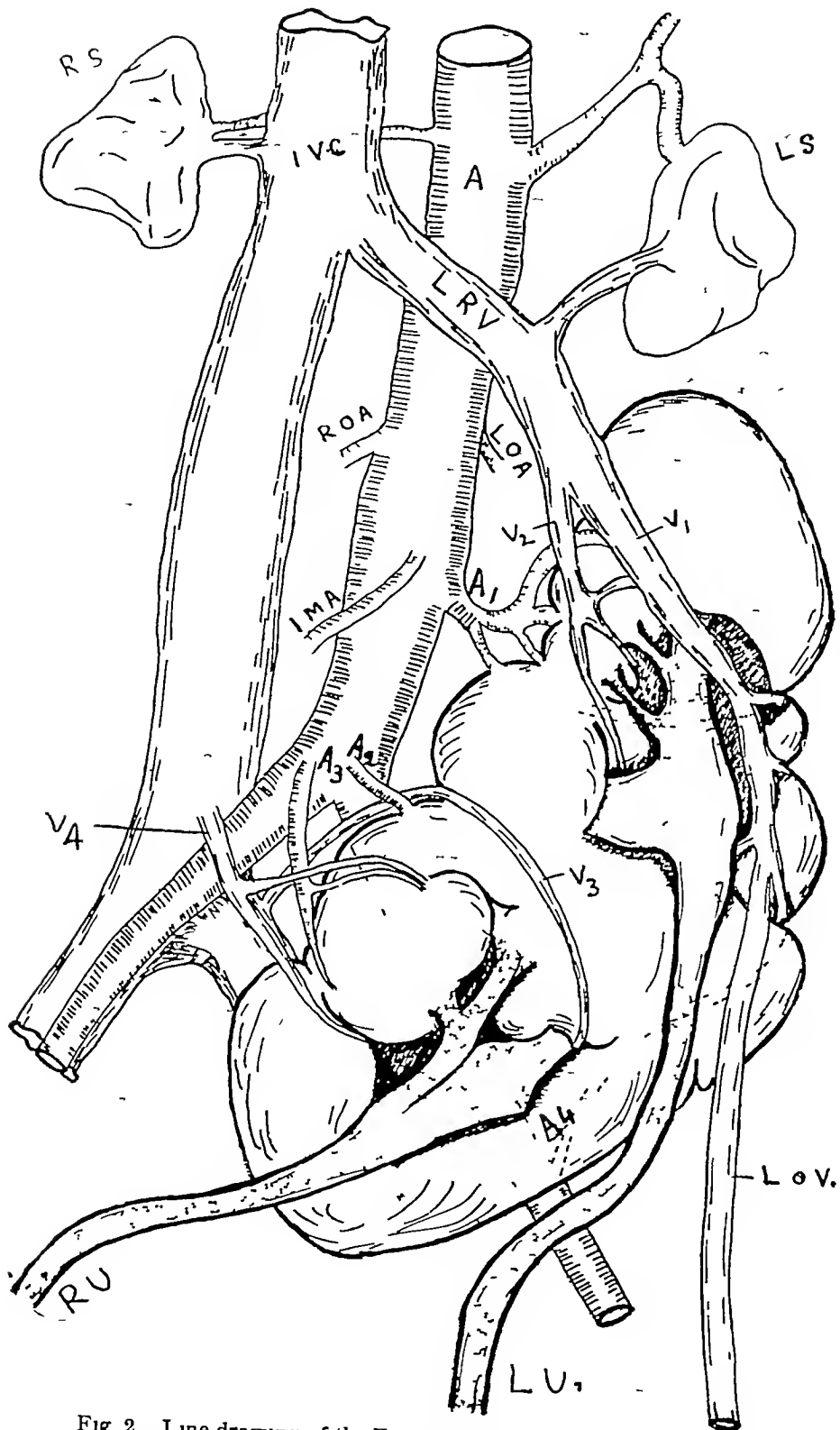


Fig 2 Line drawing of the Fig 1 showing the essential details  
 A—Aorta, A1 to A4—multiple renal arteries, IMA—inferior mesenteric artery,  
 IVC—inferior vena cava, LOA & LOV—left ovarian vessels,  
 LS & RS—suprarenals, LRV—left renal vein, LU & RU—ureters,  
 V1 to V4—multiple renal veins

As said before there are two hila on the ventral surface of the mass from which two pelves emerge (see photograph and the accompanying line-drawing figures 1 and 2) The hila are shallow and flush with the surface so that the major calyces are quite superficial The upper hilum is more lateral in position and the upper pelvis seems to be made up of at least 7 primary or major calyces, which, in turn, are formed from the union of several secondary calyces The general direction of the calyces, the pelvis and the ureter is downwards and outwards giving the impression that the upper kidney is abnormally rotating ventrally and to the left The lower hilum is more medial and directly ventral At least 5 major calyces are seen on the surface uniting to form the renal pelvis in this case The calyces and the pelvis are quite normal and as seen in the pyelogram of the specimen, the cupping is nicely marked out suggesting that this kidney mass may not have presented any symptoms or signs of obstruction during life

The right ureter is short as it arises from the lower renal pelvis of the mass It crosses over to the right side of the bony pelvis and has the usual normal relations and termination The left arises from the upper renal pelvis, descends downwards along the lateral margin of the mass and its further course and relations are normal The two ureters open into the bladder normally in the upper angles of the trigone The opposite directions of the two pelves and the ureters give one the impression that this kidney mass is undergoing torsion (Fig 3)

### Vessels

There are 4 arteries in all, supplying this kidney mass Three are given off from the aorta and one from the left common iliac artery Their origin, course and relations are shown in the line-drawing and are labelled A-1 to A-4 (Fig 2) The lower two aortic branches arise from opposite sides and the right branch crosses over to the left to reach the lower part of the kidney mass This relation along with the course of the lower ureter, suggests that the lower part of this mass is the right kidney, which therefore is the ectopic one and has fused with the left

The venous drainage is also bizarre There are 6 veins emerging from the upper hilum and their union to form the two trunks which, in turn, unite to form the left renal vein, is shown in the line-drawing The lateral of the two trunks receives the left ovarian vein and the renal vein receives the left supra-renal vein From the lower hilum 3 veins emerge Two of them unite to form a single trunk which crosses the right common iliac artery and opens into the inferior vena cava The third one takes a circuitous course to end in the left common iliac vein (all these peculiarities are shown in detail in the line-drawing (Fig 2, v-1—v-4)



Fig 3 Pyelogram showing the opposite directions of the two pelves

It is said that concomittant defects are likely to be found in other organs, specially the genitals. In this subject the ovaries are elongated, the right one being longer. It measures 3" in length and extends from the right iliac fossa to the pelvis. The bifurcation of the aorta and the union of the two common iliac veins to form the inferior vena cava are at the level of the third and fourth lumbar vertebrae respectively, *i.e.*, one segment higher than normal. These two vessels are further apart than usual.

#### Discussion

From the above description it is seen that this single kidney mass with two renal pelves and two ureters is one of ectopia and fusion of the right

kidney with the left The lower half is the right kidney and the upper the left The fusion involves the parenchyma of the kidneys and so it is difficult to demarcate the two An attempt was made to differentiate the two masses by differential injections and pyelography without much success

### Nomenclature

A survey of the pertinent literature shows that this condition is named differently by different writers It is often classed as one type of 'congenital solitary kidney' (Rokitansky), 'Crossed dystopia with fusion,' 'crossed ectopia and fusion,' 'tandem kidney,' 'Unilateral fused kidney,' 'unilateral kidney' and so on

### Incidence

The incidence of this anomaly as recorded by different authors is also very variable Out of 400 cadavers used in this department for routine dissections by the students for the last ten years, we have met only one case of this variety of malformation An equal number of clinical and medico-legal post-mortems have been conducted during this period and we are informed that no such condition has been recorded

Below is given, in a tabular form the incidence of this condition as given by different authors

<i>Author</i>	<i>Incidence</i>	<i>Remarks</i>
Shore <sup>13</sup>	1 in 839	P M amongst African natives
Stewart and Lodge	1 in 6,500	autopsies
Beer and Hyman	1 in 8,000	autopsies
Foley and Wilmer <sup>9</sup>	1 in 7,500	all cases however discovered
Morris (quoted by Pierson)	1 in 15,908	autopsies
Thompson and Allen <sup>4</sup>	1 in 10,373	autopsies

The above table is given to show the extreme rarity of this condition It is said by Bethea and Peterson<sup>4</sup> that ectopia and fusion appears to be the rarest of the congenital anomalies of the genito-urinary tract

The following historical notes may be of interest to the readers The first authentic case according to Stein was found in a post-mortem, by Hunter in 1785 Albarren in 1909 was the first to diagnose this anomaly pre-operatively by the then newly devised opaque catheter The following figures from different authors show that this condition is more frequently diagnosed clinically in recent years Up to 1930, 111 cases had been recorded and the majority of them from autopsies (Bessesen<sup>3</sup>) - But Pierson<sup>14</sup> says

that up to 1932 only 103 had been reported. According to Lowsley<sup>4</sup> up to 1933 only 7 cases are on record where it was diagnosed clinically. Foley and Wilmer<sup>9</sup> after a careful and exhaustive review, report that up to 1938, 296 cases of fused kidney are on record. But McCrea<sup>12</sup> disputes this figure and, in his opinion, up to 1941 only 162 cases of fused kidney are to be found recorded in the literature. Up to 1930, 23 cases had been operated upon. But up to 1938 the number of operated cases rose to 60. In five cases the whole mass had been inadvertently removed with death from anuria (Foley and Wilmer). Anyway the essential point is that this anomaly is extremely rare in spite of its being discovered more frequently now by routine urological examinations.

Ectopia without fusion is more frequent. One hundred and fifty four cases out of 128,322 autopsies are recorded—an incidence of 1 in 933 (Anson<sup>1</sup>). According to Campbell<sup>6</sup> the incidence is 1 in 660 at necropsy. Thomas and Barton<sup>15</sup> (1936) give the ratio as 1 in 1000 for they found 22 cases in 22,000 autopsies. But it is more frequent as per urological examinations. They give a ratio of 1 in 547. Mayo Clinic report gives a ratio of 1 in 1200 necropsies but clinically of lesser frequency (15 in 15000 examinations), the reason being that "many ectopic kidneys are asymptomatic and so they escape discovery."

Analysis of the recorded cases shows that the majority occurred in males. Below is given the sex ratio as observed by different authors.

- 34 males to 16 females (Stein)
- 18 males to 6 females (Kreschner)
- 7 males to 9 females (Pierson)
- 11 males to 9 females (Thompson and Allen)
- 31 males to 22 females (Foley and Wilmer)

Carleton<sup>5</sup> is of the opinion that this condition occurs with equal frequency on either side but other authors find a preponderance on one or the other side. Thompson and Allen believe that fused organs are more commonly seen on the right side and so the left kidney is the crossed ectopic organ. His figures are 14 : 6 in favour of the right side. But McCrea<sup>12</sup> says that the right kidney is more frequently displaced than the left.

### Classification

Several attempts have been made to classify the types of the fused kidneys. One depends on the appearance of the fused mass. Surgical books describe several varieties as the horse-shoe, discoid, sigmoid, long and so on. Another classification is according to the position of the mass in relation to

the vertebral column (Stewart and Lodge) They have listed the following types —

- 1 Pre-vertebral fused kidney
- 2 Unilateral fused kidney
- 3 Pelvic fused kidney

The latest classification as suggested by Joly<sup>11</sup> is as follows —

- 1 Complete fusion
- 2 Incomplete fusion (always occurring at poles)
  - a Fusion of similar poles
  - b Fusion of dissimilar poles

We suggest the following comprehensive classification, which we think is less ambiguous than Joly's —

- A False or fibrous union
  - 1 End to end fibrous union
  - 2 Side to side fibrous union
- B True union or fusion of the parenchyma of the two kidneys
  - a Marginal or side to side type
    - i Complete, giving the biscuit shaped kidney mass
    - ii Incomplete—forming 'H' shaped mass or pseudo-polar types or horse-shoe types
  - b End to end or polar fusion
    - I Fusion of similar poles forming a number of varieties
      - i Horse-shoe type where lower poles are fused
      - ii Inverted horse-shoe type where upper poles are fused
      - iii Long kidney where one kidney drags the other to one side of the vertebral column
    - II Fusion of dissimilar poles also forming varieties of long and sigmoid kidneys

Fusion of similar poles is said to give rise to horse-shoe kidney and fusion of dissimilar poles results in the several types of long kidneys (Joly,

Foley and Wilmer) In the majority of these end to end fusions, the upper kidney drags the lower kidney to its own side either completely or incompletely So the lower half of the fused mass is the ectopic one According to Papin, out of 70 cases recorded, in only 4 cases, was the kidney mass found to be on the side of the lower kidney (Joly) As said before, this group is further sub-divided according to the shape and position of the fused mass

### Embryology

To properly appreciate the factors underlying the fusion, one must follow the embryology of the permanent kidneys in man These are two-fold in origin The secretory part is developed from the tail end of the Wolffian or nephrogenic cord which is known as the metanephrogenic blastema This differentiates into the glomeruli, the convoluted tubules, loop of Henle and short connecting tubes The collecting system is derived from the ureteric bud given off from the Wolffian duct just before it opens into the cloaca This differentiates into the collecting tubules, papillary ducts, calyces, pelvis and ureter These two primordia fuse and give rise to the kidney The following facts of development must be emphasised —

- 1 Kidneys appear first in the 5 mm stage human embryo, when the embryo is just the 'size of a rice grain', at that stage the two ureteric buds are dorso-medial to the Wolffian ducts and are close together in front of the second sacral vertebrae During their further growth, they gain the lateral side of the Wolffian bodies and their ducts

- 2 The tail ends of the metanephric blastemas lie close to each other Each blastema shows two zones—'an inner closely packed cells with numerous mitosis and an outer mass of more loosely packed cells'—Schriner's inner and outer zones

- 3 The metanephric caps at first lie dorsally and cranially to the ureteric buds

- 4 The kidneys ascend to the lumbar level (14 mm) either actively or apparently (Hinman)

- 5 The kidneys undergo rotation in two planes Axial rotation brings the 'T' shaped kidney into vertical position with the pelvis on its ventral aspect Later the ventral pelvis is shifted to the medial border by differential growth of the lips of the hilum (Keith,<sup>10</sup> Pruman) or by rotation of the mass as a whole

- 6 The kidneys acquire their permanent blood supply when they attain their normal position in the 25–30 mm stage at the end of the 2nd

month They actually ascend an arterial ladder If they fail to ascend, the arterial supply will be from abnormal vessels given off from the lower part of the aorta, the common iliac or its branches

7 The differentiation and growth of the metanephros depend on the growth of the ureteric bud as experimental embryology has proved The ureteric bud acts as the organiser It initiates the differentiation of the metanephric blastema

8 The capsule of the kidney is definitely formed late when the embryo is 70 mm long This is said to be derived from the outer zone of Schriner whereas the inner compact zone develops into the secreting part of the renal tissue

9 The mesoderm on the dorsolateral aspect of the intermediate cell mass is loose and vacuolated This helps the developing kidney to ascend up to its normal place and to rotate medially (Fig 4)

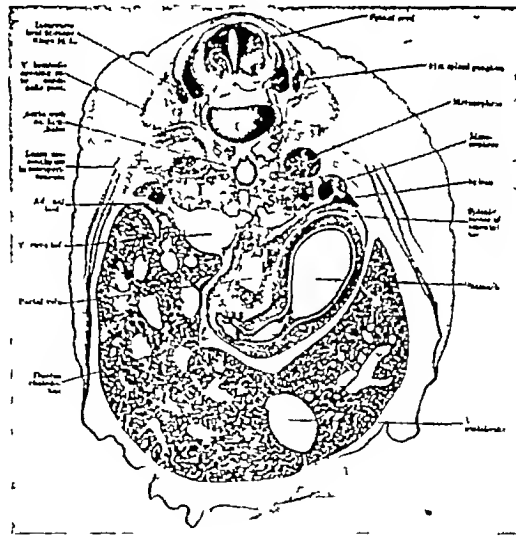


Fig 4 Transverse section of a human embryo (19.4 mm C-R length) to show the loose mesenchyme in retroperitoneum around the metanephros (Fig 553 from Keibel & Mall's Human Embryology Part 2)

The present case like all other ectopic kidneys, illustrates the fact that in ectopia there is usually incomplete ascent, incomplete rotation, persistence of foetal conditions such as ventral pelvis and lobulations, and lastly, anomalous and multiple vascular supply

Though it is difficult to explain just how and when fusion occurs, there seem to be certain contributing factors which facilitate such fusion. Most embryologists believe that the fusion occurs very early in embryonic life between the 5 and 8 mm stages when the tail ends of the Wolffian bodies—the primordia of the permanent kidneys—are very close. This is further helped by the fact that the two ureteric buds at first run dorso-medially and then turn lateralwards. So fusion must occur before the ascent of the kidneys. Such fusion may be between the outer zones of Schriner forming fibrous union or may be more intimate involving the inner zones also, resulting in the complete parenchymatous fusion. Subsequent ascent and position will be determined by the neighbouring structures like the narrow pelvis, the umbilical arteries which at that stage are on the pelvic brim and lastly the dorsal mesentery and the inferior mesenteric artery. The tail ends of the Wolffian bodies are very close and as they differentiate to form the kidneys the two blastema coalesce. The other school believes that fusion occurs during the ascent of the kidneys. It is further believed that the one kidney is always in advance of the other with the tendency of the left to lead (Schriner<sup>5</sup> and Felix<sup>8</sup>). So the more advanced kidney, as it topples over the umbilical artery on to the false pelvis from the sacral region, will be almost horizontal in position and so its lower pole will be in contact with the upper pole of the less advanced kidney which is still in the true pelvis (Joly, Foley and Wilmer). Then at that stage it is believed that fusion occurs between the dissimilar poles. But Carleton<sup>5</sup> believes that fusion of dissimilar poles occurs because of the "unusually high degree of difference in the growth rate of the ureteric diverticula. Should the cells round the lower diverticulum of one ureteric bud unite with those of the upper diverticulum of the other, an end to end or overlapping fusion will result."

Joly even believes that fusion of similar poles occurs in the earlier stage and is due to abnormal contact and fusion of the two lower ends and fusion of dissimilar poles occurs in later stages during migration. But there are cases where fusion of similar poles occurs after the kidneys have risen to the lumbar region, i.e., above the origin of the inferior mesenteric artery. The adrenals are also seen to have fused with each other in such cases. These are cases where the upper poles of the kidneys have fused and formed an inverted horse-shoe. So not all cases of fusion of similar poles occur in early embryonic life. Secondly the idea that once the capsule is formed at the 70 mm stage, no fusion of kidney parenchyma can occur is also not tenable.

Lastly, one cannot forget the newly discovered factors like the organisers of Speeman, the influence of the hormones, etc., on the proper differentiation and growth of the organs. There may be a fundamental defect in

the organising effect of the ureteric buds, which are shown to have a profound influence on the differentiation of the metanephric blastema

In conclusion, we believe that in all cases of fused kidney, ectopia is the primary cause. The kidney blastema, due to disturbances in the organiser-mechanism or to mechanical defects in the foetal pelvis or its contents, is first dislocated and comes in contact with the kidney of the opposite side and fuses with it. Amongst many such factors, two are here suggested as possible causes. One is the absence of the loose mesenchymal tissue on the dorsal aspect of the nephrogenic cord in such abnormal cases. The growing kidney is pushed to the medial side by the greater resistance offered by the more compact mesoderm, thereby increasing the chances for fusion with the other kidney.

One can also visualise the possibility of the ureteric bud, as it lies dorsomedial to the Wolffian duct, growing into the metanephric blastema of the opposite side, and there inducing the second kidney to develop. The blastema of the same side fails to differentiate due to the absence of the ureteric bud. So at least in certain cases we get unilateral fused kidney by this developmental defect.

We believe that even in the majority of long kidneys, fusion of similar poles occur. The idea of fusion of dissimilar poles when one kidney is astride the umbilical artery at the pelvic inlet, is rather far-fetched. In our opinion, fusion occurs early when the kidney primordia are still in the diffuse state, either in their caudal or medial extremities or cranial extremities. Due to fusion, ascent is abnormal. The dominant kidney drags the other one to its own side and gives rise to several types of long kidney depending upon the subsequent incomplete rotation of the two kidneys. Otherwise if both the kidneys rise with equal force, we get the horse-shoe type.

### Summary

- 1 A case of fusion of the kidneys is described
- 2 The available literature is surveyed and the incidence is discussed. A new comprehensive classification is suggested
- 3 The probable causes which facilitate fusion are reviewed. In the opinion of the writers, ectopia of the renal blastema is primary. Two probable factors which produce the dislocation and fusion are suggested

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# CROHN'S DISEASE

BY

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The Indian Medical Gazette (May 1941) in an article called 'Non Specific Ulcer of the Alimentary Tract' states that in the course of a large number of autopsies a variety of ulcers are seen in the alimentary tract that do not have the characteristic gross appearances of any known specific ulcer. Histological examination of the ulcer fails to show any characteristic cell picture.

There is a second group of autopsies in which the clinical history is very strongly suggestive of a specific lesion but the autopsy findings are very variable and quite unlike the changes usually noticed in specific infections. This group is of great clinical importance from the point of view of treatment of such cases.

The third group is that of non-specific ulcers caused by obvious pathological processes like embolism, obstruction and neighbouring acute infection like appendicitis or salpingo oophoritis. Non-specific ulcers may also occur as a result of chronic congestion and oedema of the intestine as in cirrhosis of the liver or congestive heart failure.

The clinician definitely accepts the group of non-specific enterocolitis as a clinical entity with certain characteristic symptoms, signs, X-Ray findings and lines of treatment. It was Crohn (1932) who was the first to establish this disease entity.

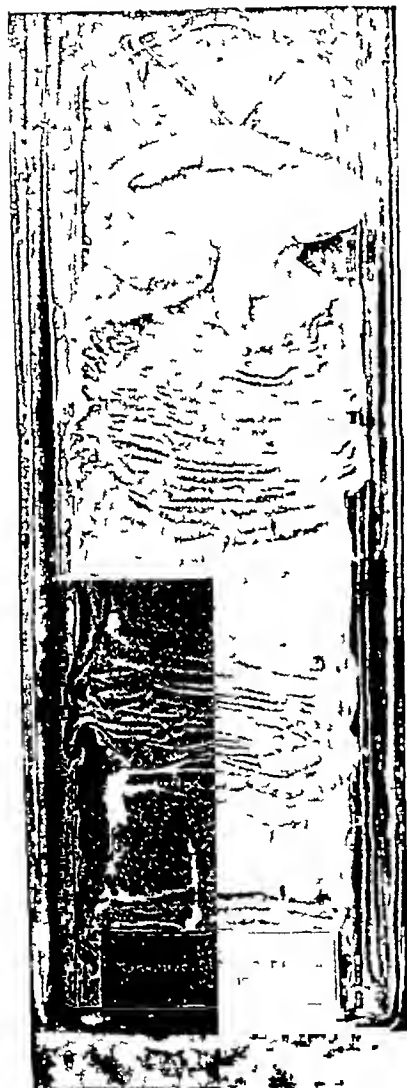
The cases are often met with in middle aged individuals with diarrhoea, occasional passage of blood and mucus per rectum, anaemia and oedema. Repeated motion examination fails to show any specific cause.

At autopsy major changes are found in the rectum and ileum. The colon is very slightly if at all affected. The ileum shows diffuse or patchy thinning of the walls.

A number of articles have appeared recently describing acute segmental inflammation of portions of the alimentary canal describing these as acute regional jejunitis, ileitis or colitis. At the same time a series of similar cases were encountered in the autopsy room.

Manohar (1941) collected 44 cases of non-specific ulceration of the alimentary tract —

		Acute	Chronic	
Distribution of lesions	Oesophagus	8	5	(13)
	Jejunum	3	0	( 3)
	Jejunum and ileum	4	1 ?	( 5)
	Ileum	4	2	( 6)
	Mesenteric glands	4		( 4)
	Colon	6	4	(10)
	Rectum	3	7	(10)



Figs 6 & 7 Photographs of the Serous and mucous surfaces of the affected segment of gut

*Acute Jejunitis and Ileitis* Characteristic of these lesions is segmental distribution and simultaneous involvement of all coats of the segment in-

volved On opening the peritoneum portions of congested intestine are seen to alternate with portions of normal looking intestine In the early stages there is haemorrhage into the serus coat and enlarged mesenteric glands suggestive of an enteric infection Later, the massive haemorrhage suggests infarction due to mesenteric thrombosis

On opening the intestine there is well-marked haemorrhagic infiltration which may be diffuse or in patches The mucous membrane is necrotic in patches which are raised up into everted greenish folds or round areas, shedding of mucous membrane and formation of undermined ulcers was considered as against the condition being non-specific inflammation. Peyer's patches are occasionally the seat of haemorrhages but are not primarily enlarged or inflamed as in primary enteric infection The ulcers did not show any tubercles at the edges or on the serous coat The white radiating lines in the serous coat so characteristic of tuberculous ulcers were not present Histological examination failed to show any tuberculomata. Strictures and hypertrophic thickening was not noticed.

The chronic type is seen in younger persons—age 20-30 years, females predominating 5 to 2 There was diarrhoea, wasting and pain in the abdomen and cases were operated

In the ileum there was uniform thinning of all coats and patches of mucus lining these areas On wiping off the mucus shreds of mucus membrane dislodged In the drainage area of the part, one or two sentinel mesenteric glands were found enlarged which on section were red with yellowish spots but no definite pus Microscopic examination showed lymphadenitis with focal cloudy degeneration Although mesenteric glands have been mentioned separately they were not found as an isolated lesion but in association with acute or chronic enteritis

Bant's description of regional colitis is that the involved portion is from greyish red to purple in colour The serosa is covered with a fibrous exudate The bowel feels doughy

The chronic regional colitis was of the standard type—segments of pelvic colon and rectum being chiefly involved and thickening and fistula formation being the chief abnormality Histology was characterised more by the absence of any specific appearance than by the presence of any characteristic appearance

Boyd says that the site of election is the final 12 to 18 inches of the ileum ending abruptly at the ileocaecal valve so that it has been called terminal ileitis But other segments of the small and even large intestine may be involved The affected part is thick, heavy and reddened The lumen is narrow and the intestine above becomes dilated The mesentery

is stiff and greatly thickened and adhesion of the bowel and neighbouring structures (bowel and abdominal wall) is followed by slow perforation and fistula formation. Microscopically the lesion is a non-specific inflammation first of the mucosa and later of other coats of the bowel with occasional foreign body Giant cells probably due to inclusion of vegetable particles. The clinical picture resembles that of ulcerative colitis, but may begin with an attack like appendicitis—the appendix has often been removed—while the fistulous and obstructive stages may suggest tuberculosis, actinomycosis or malignancy. The outstanding clinical features are a mass in the right iliac region, diarrhoea and fever. The aetiology is uncertain, but at least some of the cases may be due to bacillary dysentery. It seems justifiable to consider the condition as related to chronic ulcerative colitis.

Crohn, Einberg and Oppenheimer gave a full account of the condition in 1932—"a stenosing and plastic ileitis of the last foot of the ileum"

The terminal ileum alone is involved. The disease begins as a sub-acute or chronic ulcerative ileitis and proceeds to stenosis. Fistulae may develop opening into the caecum or colon. The process involves the ileo-caecal junction, but not in the first place the caecum and is more marked at the juxta-caecal portion. The course is relatively benign and stimulates clinically an ulcerative colitis with diarrhoea and blood and mucus in the stools. Some fever may be present and a tender mass may be felt in the right iliac fossa.

The ulcerative colitis are of different groups

(a) Irritable bowels—*i.e.*, mucous colitis, there is a large nervous element and often abuse of purgatives and washouts, the tests are negative, no ulcers are seen on sigmoidoscopy and there is no specific organism.

(b) Familial or hereditary polyposis of colon with secondary infection.

(c) Regional colitis—here the distal colon is normal.

(d) True ulcerative colitis due to specific streptococcus. It starts in rectum and works up the ascending colon and ultimately involves the ileum. Rosenow has grown specific short (two or four) chain *Streptococcus viridans* from swabs taken from the edges of the ulcers. This same streptococcus has been recovered from cavities in carious teeth and crypts in the tonsils. By packing cavities in dog's teeth with this streptococcus and sealing them over they got ulcerative colitis 12 months later.

The etiology may be considered under two heads (1) bacteriological findings and (2) possible predisposing causes, *i.e.*, (a) scrapings from ulcers for amoebae, (b) culture of scrapings in Gudo's medium, (c) widal reaction and (d) presence of tubercular foci elsewhere.

Mayo considered that an acid fast bacillus allied to the bacillus of John's disease in cattle is an important causal agent, but at the present time if acid fast bacilli were found, the cases were regarded as those of tuberculosis of the intestine

Positive findings have been *B. Coli* from meningeal exudate from a case of acute ileitis and streptococci from the heart blood in 2 cases

Predisposing factors may be (1) worms—usually seen at autopsy and (2) anaemia—which in most cases is probably a result and not the cause of the disease

Examination of the contents of the resected loops by cultural methods have given more reliable information. Monroe gives the following in order *B. Coli*, Bagen's streptococci, haemolytic streptococci, streptococcus viridans, salmonella, grampositive diplococci and bacillus alkaligenes

Bagen investigated rectal swabs and he gives much importance to a spreading variety of streptococcus but this view like that of Rosenow's has met with very adverse criticism. Christopher is of opinion that amoebiasis plays an important role in the earlier stages of the condition. Later amoebae disappear and that is why emetine causes no improvement

Falsen considers that bacillary dysentery may play a part and he examined the sera for agglutination. The presence of anti-dysentery-phage in abundance in the stools of these persons is some evidence of the bacillary origin of this condition. The bacteriology of the condition however still remains unsettled

The essential characteristics of the lesion therefore are (1) the incidence in young adults, (2) may be acute or chronic and even in the acute stage the lesion is essentially a hyperplastic one, (3) enlargement of lymph glands, (4) destructive ulceration of the mucosa with disproportionate connective tissue reaction of the remaining wall of the intestine and (5) there is abrupt commencement and termination of the inflammatory lesion

Syndromes that it may resemble are (1) acute abdominal illness as appendicitis or intestinal obstruction (acute), (2) chronic appendicitis, (3) ulcerative colitis, (4) Crohn's own type with repeated attacks of vomiting and abdominal pain and evidence of chronic intestinal obstruction and (5) persistent fistulae in the right iliac fossa

Ogilvie mentions that sometimes there may be spontaneous appearance of a fistula in ano or a recto-vaginal fistula—he saw a case in a young girl

## CASE REPORT

Abdul Khader, Age—45 years, Mohammedan male, Occupation—Ryot

Admitted 8-7-42 Discharged 8-8-42

*Complaint*—Pain in the left hypochondriac region for the last 10 years

*History of present illness*—Pain started 10 years ago in the left hypo-chondrium extending slightly to the epigastrium. The pain used to be continuous for a period of 5 months and then subsided for about 2 to 3 months. For the last 9 years the pain is intermittent and constant since the last five months. Vomiting after food relieves him of the pain.

*Condition on admission*—Patient is an ill nourished individual of 45 years, anaemic, no cyanosis. Bowels regular cardio-vascular and respiratory systems nil abnormal, tongue clean and moist, teeth dirty. Submandibular glands on the left side enlarged and palpable. The groin glands are hard and enlarged on the left side.

*Local condition*—Abdomen moves freely with respiration. Tenderness in the left and right sides of the lower abdomen. Tenderness in the left hypochondrium. No rigidity over the area. Liver and spleen are not enlarged. No other palpable masses in the abdomen.

*Investigations*—B.P. 80/40 m.ms. Screaming with Barium meal—nil abnormal.

Fractional test meal—normal. Blood W.R. and Kahn—negative. No evidence of tubercle in the Guinea pig inoculated from the mesenteric gland.

17-7-42 Operation Under spinal anaesthesia by Dr N S Narasimhan—abdomen opened by an upper right paramedian incision. Stomach was found normal. About 4" from the duodeno-jejunal flexure there was a stricture. Three other commencing strictures about 4" apart were found. Affected areas were congested. A portion of gut 12 inches in length was resected and end to end anastomosis done. Mesenteric glands were found enlarged. A gland was removed for biopsy and inoculation. Resected gut sent for pathological examination.

30-7-42 Sutures removed. Wound healed by 1st intention.

*Description of specimen*—Macroscopic 12" long. 1st stricture showed serous coat not thickened but stricture well marked and found on the serous aspect. 2nd stricture showed mucous membrane completely absent and thickening of all coats. There was an area of complete denudation of mucous membrane for two inches, without stricture. Coats thickened. Then there was intervening healthy tissue and then an area of incomplete denudation of mucous membrane with thickening of all coats.

*Histological report*—(1) Section taken from the intestine shows granulomatous ulceration with marked oedema and plasma cell reaction. (2) The lymph nodes show sinus catarrh, marked plasma cell reaction and a few collections of endothelial cells with occasional giant cells. The ulceration seems to be of non-specific origin.

In the Madras Medical Journal 1930 under the heading of reports of rare cases, I reported a case of hyperplastic tuberculosis of the jejunum. Isolated hyperplastic tuberculosis of the small intestine is rare—only 7 cases have been reported up to 1930. Chronic hyperplastic tuberculosis was first described by Hartman and Pillet in 1891. Canath in 1898 reviewed 77 cases.

Lartigall's monograph (1901-05) may be considered to be the most exhaustive pathological study of the subject. In 90-98% it affects the ileo-caecal region. Occasionally the rectum is involved, less commonly the ileum in conjunction with the caecum and almost never the ileum alone. It is a disease of long duration, the most conspicuous feature is the extensive formation of fibrous and tuberculous granulation tissue in the involved region. Necrosis and caseation do not occur as a rule and ulceration unless of the chronic enteric type is not seen. Involvement of regional lymph nodes with or without caseation is the rule. Hyperplastic tuberculosis of the small intestine occurring in conjunction with caecal tuberculosis is uncommon but as a single isolated lesion appears to be rare.

Lartigan observed "here it is not so often a question of those large tumour masses so easily mistaken for carcinoma, the growth is ordinarily more limited and less voluminous. More complete stenosis has been observed." Lartigan could find only two cases of this disease limited to the small bowel.

The progress of such a disease is towards obstruction of the small bowel, the symptoms are ballooning of the intestine, visible peristalsis, borborygmi accompanying the colic with the appearance of an elongated tumefaction.

The case which I reported was operated on by Col E. W. C. Bradfield, I.M.S., then Professor of Surgery in the Madras General Hospital and I assisted at the operation.

The patient was a male, aged 40 years, and was admitted into the wards for a hard and irregular swelling of eight months duration below and to the right of the umbilicus—movable with respiration. The patient complained of symptoms of duodenal ulcer and very vigorous peristalsis was noticed at times. Lungs were normal and he had no pyrexia. Laparotomy revealed what was thought to be a tuberculous mass involving the jejunum close to the duodeno-jejunal flexure, below this the small intestine was thickened and dilated for about 8—9 inches, where there was another large mass involving the glands in the mesentery. The intestine between the two masses was dilated and hypertrophied. A resection was not done, the gland was not taken for biopsy, a gastro-enterostomy distal to the second mass with an entero-anastomosis between the ends of the loop was done and the patient made an uneventful recovery and was discharged on 2-10-30. I have not been able to trace this patient.

Now one would recognise this to be a case of non-specific ulceration of the intestine. In the same paper I reported another case of a male aged 35 years of tuberculosis of the small intestine involving the caecum and splenic flexure with a duodenal ulcer.

At about this period a young male doctor exhibited symptoms of duodenal ulcer and had melaena. An operation was proposed several times but was postponed. After a year or two he was operated on by an eminent Surgeon of unrivalled experience of Surgery and abdominal Surgery in particular. He performed a laparotomy and recognised what appear-

ed to the multiple tuberculous lesions of the small intestines. The patient made a remarkable recovery and put on weight and continued to do active work. About 1936 he had repeated melaena and was clinically recognised as regional ileitis and in 1941 another Surgeon operated on him and resected the small intestine. The patient is in excellent health.

Several cases are recognised by Surgeons in the Moffusil districts and cases are reported by Col Cox from Madura and by other Surgeons from the same hospital. Non-specific ulceration was noted in one case of caecal enlargement by Dr C P V Menon and of extensive ulceration with multiple strictures of the small intestine by Dr N M Rao—both of the Madras General Hospital.

A soldier aged 27 years with a history of vague attacks of umbilical pain of increasing frequency and severity over a period of three years was admitted into a hospital with a diagnosis of recurrent appendicitis. WBC 15,000 with predominance of polymorpho unclear leucocytes.

During operation there was cloudy fluid in the peritoneal cavity and 6" of lower ileum was acutely inflamed and thickened. The resected specimen showed partial obstruction due to thickening of the wall and reduction of the lumen for approximately 2". The mucous membrane was covered with ragged ulcers and the muscular wall was thickened hard and rather translucent. Microscopically there was old fibrosing granulomatous lesion. Patient showed signs of tuberculosis elsewhere.

It comes to this that if we are on the look-out, we are able to recognise the lesions.

The lesion is not a new one and there are two specimen of ileum in the Guy's Hospital Museum in the Bright's Collections (1827). The period 1930-40 is noted also for the recognition of ulceration of the rectum as due to lymphogranuloma.

In Guy's Hospital report 1939 (No 1) Jam Hurst describes 3 cases with fistula formation, Bower and Day give post mortem findings in a case of regional ileitis nine years after symptomatic recovery following ileocolostomy,

Edward et al describe a case treated by ileo transverse colostomy. Gill describes two cases of acute regional ileitis treated conservatively.

Mixter records a case of Crohn's disease, a bad one with a long history, pus in the urine and two ileo-sigmoid fistulae. Two stage resection was done. First stage—ileo transverse anastomosis—2nd stage—two feet of ileum were resected with the caecum. The ileum was stuck to the bladder but there was no perforation. The specimen showed several separated areas of the disease.

MIXTER had 20 cases 17 Jews and 3 Gentiles On 3 appendectomy only was done In 8, one stage resection with one death In 9, multiple stage resections with 3 deaths Mortality 20%

In the survivors there had been no recurrence He says they are very difficult cases to know whether to operate, when to operate and what to do Characteristic features are loss of weight and attacks of partial obstruction. They do not get better without operation, they all progress with intervals of quiescence Deep X-Ray might lead to breaking down and sinus formation Lateral anastomosis does not cure and is usually done as a first stage Some get better and others worse, and it is not possible to estimate this Probably it is the mesenteric involvement which leads to bad results

Aden had 4 recurrences and insufficient resection of mesentery is the chief danger

*Radiological features* In the prefistulous stage the barium enema reveals no abnormality, but an opaque meal shows a varying amount of ileal stasis and dilatation above the lesion depending on the degree of stenosis, the involved segment itself presents an irregular narrowing of the lumen most marked at the terminal end and absence of peristaltic waves When fistulae have formed deformity in the colon may be seen from the spread of stenosing inflammation to the colonic wall This may cause a filling defect in the ascending colon or sigmoid closely resembling a carcinoma, the fistula being accounted as a cancerous one J L Kantor in a report of 6 cases noted the presence of spasm of the caecum (Stierlin's sign) The spasm is partly organic and partly spastic Kantor also noted a string sign in the affected portion of the ileum and points out that this may be double when a fistula has developed due to barium in the contracted ileum and fistulous track

*Differential Diagnosis* The condition is rarely diagnosed radiologically owing to its resemblance to tuberculosis or actinomycosis of the ileo-caecal region When perforation into the colon has occurred it is likely to be mistaken for cancer of the latter viscus Ulcerative colitis, Hodgkin's disease, lymphosarcoma and chronic hyperplastic appendicitis are mentioned as other conditions which may simulate it and the true nature is usually apparent only on the operating table or on histological examination

*Some unusual features and observations* Pain may be referred to the abdomen as a whole especially when the lower parts of the small intestine are involved in multiple strictures Pain is produced at the point of dilated and hypertrophied bowel and not at the actual site of stricture It is rarely that the indurated stricture of the ileum can be detected Tenderness on pressure is due to mixed infection

*Massive intestinal haemorrhage in regional enteritis* (L S Fabi's, Sept 1941, A J of Surgery) The case report is of the finding at operation

of regional enteritis in a patient whose outstanding pre-operative symptom was repeated and profuse internal haemorrhage. He records that in the other 27 patients in the same hospital this symptom was not noted or recorded in the literature. Man aged 24 years admitted for sub-acute intestinal obstruction. Previous X-Ray examination of the alimentary tract did not show anything abnormal. Large quantities of bright red blood was passed per rectum and there was anorexia, frequent watery stools and loss of weight. Serial X-Rays then showed evidences of obstruction in the terminal ileum. A regional enteritis of 2" of ileum was discovered and resected. (The mesentery was thickened and contained many enlarged nodes. Serosa-moderately thickened with areas of congestion and haemorrhage.)

Most authors comment on the rarity of blood in the stools. In a summary of the literature in 1939 Shapiro says that in the ulcerative type of enteritis the stools contain mucus and blood, but no grossly visible melaena is noticed. Dickinson at Al (1939) make similar statements and also Crohn (1939 S G and Obst), Bergen (1939) in his recent summary of the symptomatology of regional enteritis does not even refer to bleeding. Regional enteritis must be considered in the differential diagnosis of massive intestinal haemorrhage though bleeding is a rare symptom of the disease.

### Summary

- 1 A case of non-specific ulceration of jejunum with photographs of the resected portion is reported.
- 2 Allusion is made to other un-recognised cases of the author.
- 3 In addition to the acute appendicitic type ulcerative colitic, chronic intestinal obstructive, massive haemorrhagic and duodenal ulcer syndrome types are described.
- 4 A summary of the literature is reviewed.

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# INJURIES TO THE COMMON BILE DUCT

BY

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Cases of injury to the Common Bile Duct, during operations in its neighbourhood are fortunately rare in this country and when such occur it is not often that one has a chance of following up the case for a number of years, as patients are difficult to trace once they have left Hospitals. The following case is so instructive that I thought it worth while recording it in some detail as it may be of interest to those who practise this branch of Surgery.

Mrs J, age 31, mother of three children, the last 1 year and 9 months old, reported for treatment on 10th March, 1938. She had suffered for 2½ years before coming under observation with mild pain under the right Costal Margin lasting a few hours at a time. The first attack occurred one morning and was attributed to unusual physical work the day previous to its onset. Later the intervals became irregular, sometimes as long as a few months. Morphia was employed when pain was severe and for comparatively long periods she would remain free from trouble. In 1937 she had a number of bad attacks. Recently they have become mild, no vomiting has occurred at any time. Belching of gas usually followed the attacks and gave relief. There has been no Jaundice or fever at any time. Pain is also felt below the right breast and at the right lower back. She has had asthma since July, 1937. Patient had a fall 5 days before admission and X-rays show a fracture of the 4th piece of the Sacrum. She does not complain much of this injury.

On admission for treatment on 10-3-38 her general condition was good. Tongue thinly coated. Heart and lungs normal. No tumours in the abdomen, tenderness or rigidity. Plain X-ray shows nothing abnormal. Shadocol pictures were not taken. B P 110/72. Urine contained nothing abnormal. Patient was given large doses of glucose and calcium by mouth, preparatory to operation. Neither sugar nor bile pigment ever appeared in the urine. Her blood-clotting time was normal. Blood cells and haemoglobin showed normal figures.

On 15-3-38 through a Right Vertical Paramedian incision, the abdomen was opened and disclosed a contracted and thickened gall bladder. Two large stones could be palpated in it. Cholecystectomy was performed. The adhesions at the area of the cystic duct made identification of the structures here very difficult and damage occurred accidentally to the common duct. This was not recognised till the cystic duct had been divided. It now appear-

ed that the Common Bile Duct just below its upper end had been included in the ligature and a small segment was divided with the Cystic Duct. The ends were secured and brought together over a rubber T-tube and sutured. The long arm of the T-tube was brought through the Omentum which was packed round the injured duct and was led out of the abdomen through the abdominal incision. Morrison's pouch was drained by another tube brought out through a stab incision to the right of the main one. The post-operative course did not cause any anxiety. Drainage through the stab incision was bile-stained for a few days when it stopped completely. Bile drained freely through the T-tube, at first amounting to about 20 ounces a day, gradually decreasing till in about 10 days it ceased altogether and a fortnight after the operation, the T-tube was removed. There was no biliary fistula and as the abdominal wound had healed normally she was discharged cured on 5-4-38.

About two months later she wrote that she felt very well, her pains had disappeared and she had put on weight, but shortly after writing this letter she began to feel thirsty and an examination of the urine disclosed the fact that it contained sugar. A week later she developed Jaundice. She consulted her family doctor and was now put on restricted diet and steadily lost weight and became gradually weaker. Her motions were found to be clay-coloured.

On account of these developments she was re-admitted to Hospital on November 1938 and showed the following signs on arrival —

19-11-38 Marked emaciation—skin dark, coarse and dry. Troublesome itching of skin keeps her awake at night. Conjunctivae deeply yellow. Tongue thinly coated, gums spongy—Heart and Lungs—nothing abnormal, but liver was hard and enlarged a hand's breadth below the Costal margin. Blood Pressure was 110 Systolic and 70 Diastolic.

Urine contained Sugar 6%. Albumen and bile pigments were present and under the microscope showed granular casts and pus cells. Motions were clay-coloured. Blood-sugar 0.29%. Blood urea was normal.

Vanden Berg direct—negative. Indirect—positive  $2\frac{2}{3}$  units. Icteric index—24 units.

It was obvious that there was again complete block in the biliary outflow and operation was performed on 27-11-38 under Gas and Oxygen. A right paramedian incision was made close to the scar of the previous incision. On entering the abdomen, considerable adhesions of omentum to the abdominal wall were encountered. On freeing these, the liver was found to be large, mottled and hard. At the hilum adhesions of omentum anchoring the 1st part of the duodenum were encountered. Much oozing followed dissection as numerous veins were found everywhere. Finally the hepatic

ducts (right and left) were isolated and on being opened clear white bile gushed forth into the wound. Into these a soft rubber catheter (No 12) was inserted and brought out through the incision. Morrison's pouch was drained through a separate stab incision. Abdomen was closed in layers.

In three hours after the operation, the discharge through the catheter became yellow green and continued so afterwards.

*After-treatment* Intravenously she received 25 c.c. of 25% Glucose twice daily and she improved steadily. She had to be catheterised for a couple of days after the operation. The bile draining from the tube was collected and given back to her per rectum twice daily. She suffered from much flatulence now and had to be given an intravenous hypertonic saline infusion which rapidly restored the tone of her bowels. She passed flatus and motions thereafter. A week after the operation the patient was on solid diet. The bile continued to drain from the tube and her Jaundice showed a marked reduction in its intensity as evidenced by the colour of the urine and the staining of her Conjunctivae.

On the 13th day after operation bile was draining freely, but it was noticed that intestinal contents, whitish curdy particles also escaped by the side of the tube. The next day the tube slipped out, but was easily replaced. A good deal of drainage of bile occurred both through the tube and outside it. A few days earlier it had been noticed that the motions were assuming a normal colour. Her Jaundice had all but disappeared. There was no longer any itching sensation in the skin. The enlargement of the liver, however, remained.

The catheter draining the bile ducts was now removed (33 days after operation) as it was believed that a passage between the hepatic ducts and the duodenum had now spontaneously formed. In a few days the fistulous track in the abdomen ceased draining and rapidly healed up. Bile, however, was escaping into the bowels as the motions were of normal colour, but her itching sensation in the skin had begun to return and it was suspected that the drainage of bile into the intestine was not as free as before.

Her general condition had improved, there was very little staining of the conjunctivae, the skin had become normal in colour and texture and there was no itching. Motions were yellow. Liver was still enlarged a hand's breadth below the Costal margin. Her periods had returned, the 1st one since 12 months.

Although she was advised against it, she had decided to go home. She however agreed to report by letter frequently.

She continued to keep well and 2 months later there was no sugar in the urine. She put on weight. Mucous stools were yellow, there was no pruritus. Appetite was good.

A month later she suffered for 3 days from what appeared to be Influenza. Improvement in general health continued, but 4 months after the 2nd operation, although she reported being otherwise well, stated that her urine contained 1.75% sugar. One month later she was well and had by now gained 6 lbs in weight.

Thereafter she was lost sight of for many months, but in 1940 it was reported that she sought treatment in another Institution where her condition did not improve. She was then in a serious state as her Jaundice and emaciation had returned. She however would not agree to seek surgical help and left Hospital in a sinking condition.

The points of interest in this case are as follows —

- 1 Injury to the Common Bile Duct high up where the union of the right and left hepatic ducts occur is a particularly unfortunate incident on account of technical difficulties in re-construction.
  - 2 It is possible that at the spot where end to end suture of the Common Bile Duct over a T-tube was performed in this case, subsequent stenosis was the cause of slowly developing Jaundice, terminating with symptoms of total biliary occlusion in the course of a few months after operation.
  - 3 The onset of Glycosuria with progressive biliary obstruction and its complete disappearance when biliary drainage was restored by the 2nd operation may be noted.
  - 4 The 2nd operation which was meant to re-establish biliary drainage either internally by hepatico-duodenostomy or externally by producing a biliary fistula succeeded temporarily in doing so.
  - 5 The spontaneous communication which developed about 10 days after operation between the hepatic ducts and the 1st part of the duodenum as indicated by the escape of milk clots along the track of the drainage tube and by the return of normal colour in the stools is an unusual occurrence, possibly produced by the pressure of the drainage tube over the 1st part of the duodenum.
  - 6 It would appear from the later development of Jaundice that this communication gradually became obliterated by scar pressure around it.
-

# A CASE OF VILLOUS MALIGNANT PAPILLOMA OF THE GALL BLADDER WITHOUT STONES

BY

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Very few cases of villous papillomatous cholecystitis without stone are reported in the literature and when it turns malignant it is said that stones are almost invariably found Zenker found them in 80% of cases, Curvoisier found them in 91% of cases, Janowsky in every one of a series of 45 cases London Hospital reports show that it occurred in every case of carcinomatous gall-bladder

*A case illustrating a malignant villous papilloma of gall-bladder without stones*—A Hindu female aged 45 years was admitted in 1935 for treatment of a swelling in the upper abdomen and of recurring attacks of pain in the same region Duration one year Her present complaint started with a sudden attack of a severe stabbing pain in the right hypochondrium which gradually subsided, since when she has had recurring attacks At first the interval between the attacks was 2 months, later it became 2 weeks and since 10 days prior to admission she has had attacks almost every day She had noticed a swelling in the upper abdomen 6 months after the onset of the first attack

On admission she was moderately well-nourished, not anaemic, conjunctivæ showed a slight icteroid tinge Circulatory system was normal On examination a visible tumour in the right epigastric and umbilical regions was found The tumour moved up and down from under the costal margin during respiration No pulsation or visible peristalsis was noted The tumour was elongated with its long axis directed downwards and medially and during deep inspiration the tumour was found a finger's breadth above the umbilicus It was firm, elastic, the sides sloping and the lower pole rounded The lower pole permitted movement upwards and lateralwards There was no tenderness Liver was palpable Spleen was found to be normal

*Nature of the attacks of pain*—An hour before the pain, she used to experience some prodromal symptoms A sense of discomfort in the abdomen, retching, yawning, and rapidly increasing general restlessness A desire to empty her bowels resulting in a large motion of normal consistency and colour followed by pain in the region of the tumour The pain was at first vague but soon assumed a stabbing character shooting towards the point corresponding to the junction of the last rib with the sacro-spinals on right

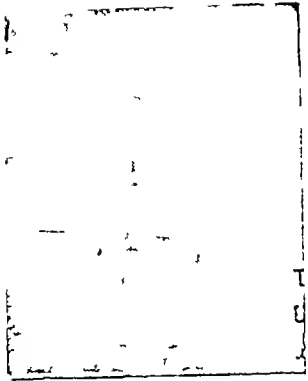


Fig 7 Ordinary radiograph with shadocol Note the absence of excretion in the gall bladder



Fig 8 Barium meal picture showing the notch in the region of the pyloro duodenal area caused by the enlarged gall bladder

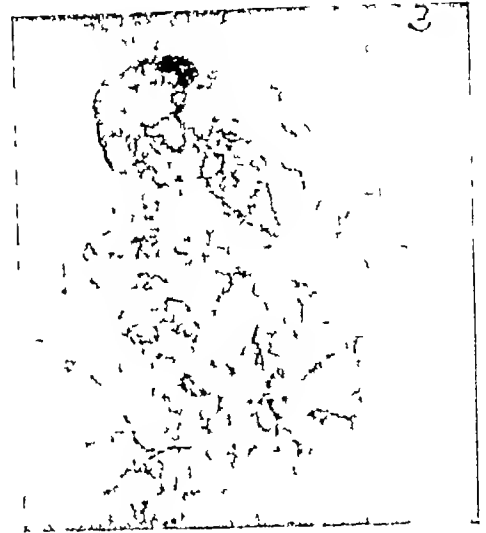


Fig 9 A photograph of the specimen showing the villous papilloma of the gall bladder

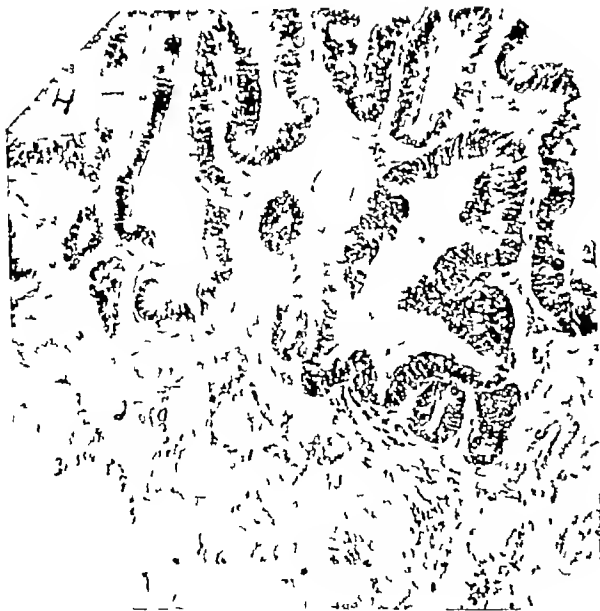


Fig 10 A micro-photograph of the gall bladder showing the villous condition of the gall bladder with permeation of the malignant cells in the deeper areas

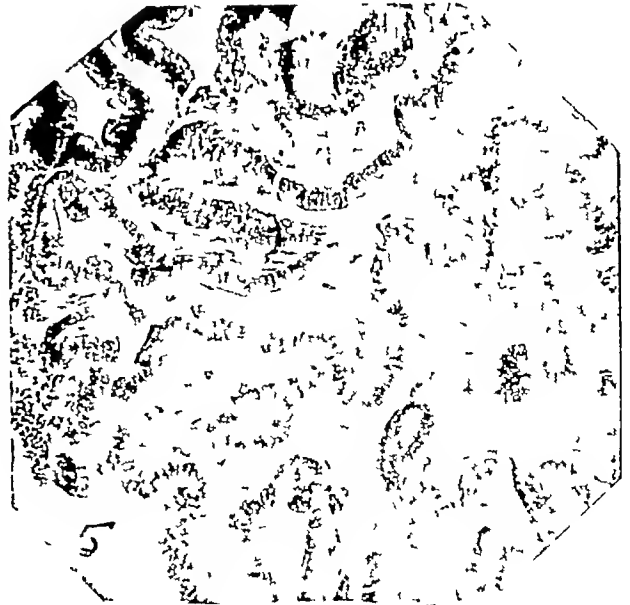


Fig- 11 Another micro-photograph in another perspective

side The pain was not referred to the shoulder It was followed by vomiting which consisted of ingested food, mixed with bile which was bitter to the taste There was no blood in the vomit After vomiting, the pain ceased and the whole body was bathed in perspiration and finally the patient went to sleep In between the attacks, she felt perfectly alright and was never jaundiced after the attack She had lost considerable weight Urine examination showed a trace of bile pigments, otherwise it was normal Blood was normal Blood pressure was 110/76 mm of mercury Van den Bergh test was direct positive biphasic, indirect positive Cholesterol content 232.6 mgm per 100 c.c. of plasma Bilirubin content was 1.66 units Fractional test meal examination showed acidity, free and total, normal Laevulose tolerance test was found to be within normal limits

Shadocol with barium meal examination showed no excretion of dye in the gall-bladder which was not visualised in any of the pictures taken Barium meal examination showed a distinct notch in the region of the duodenum due to the enlarged gall-bladder Stomach was empty in normal time Operation was decided on, the Abdomen was opened under local anaesthesia Mayo-Robson incision was adopted On opening the abdomen, the liver was found enlarged with a markedly enlarged gall-bladder which was thick and pale white Cholecystectomy was performed and the oozing from gall-bladder bed was stopped by putting stitches through the liver There were enlarged glands along the common bile duct which were removed for pathological examination The abdomen was closed in layers and the specimen was sent for pathological examination

The patient had slight hiccough and cough after the operation Hiccough lasted for 2 days and bronchitis persisted with a slight patch of broncho-pneumonia at the right base for 10 days She was discharged cured on the 16th day after operation The pathological report showed the following —

### Pathological Report

1 Gall-bladder villous papillary adeno-carcinoma The wall of the gall-bladder showed malignant infiltration

2 Lymphatic gland chronic inflammatory No evidence of malignant infiltration Fibrosis and calcification found

### Points of Interest

1 A tumour of the upper abdomen was found on the right side which was diagnosed as a case of chronic cholecystitis with enlargement of the gall-bladder and was operated on as such

2 At operation, the gall-bladder was found thickened and there were enlarged glands along the common bile-duct

3 The naked eye appearance of the lining of the gall-bladder showed a papillomatous condition with no stones in it

4 The histo-pathological picture showed a papillomatous condition with malignant changes with infiltration into deeper tissues

5 There were attacks of colic resembling "Biliary colic" Were these due to the passage of bits of villi which got detached and while passing through the bile duct, caused the symptoms, or were there stones in the gall-bladder which were all extruded during the Biliary attacks ?

6 The glands along the common bile-duct removed at operation showed no malignant infiltration

7 The follow up of the case has been difficult as the letters sent to her were all returned by the Dead Letter Office

# PRIMARY TUBERCULOSIS OF THE APPENDIX

BY

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Tuberculosis of the gastro-intestinal tract is very common in India. All forms of the pathological manifestations of tuberculosis in the abdomen mentioned in text-books are commonly found. But primary tuberculosis of the appendix is very rare. Out of 320 appendices removed, either for appendicitis, acute or chronic, or in the course of operations for gastric and duodenal ulcers from the year 1932-38, histo-pathological examination of these appendices showed tuberculosis of the appendix in only one case. This condition being rare, literature on this subject is very scarce. Maxwell observed from an analysis of 8087 post-mortems that there were 785 cases of pulmonary tuberculosis, and 233 cases of abdominal tuberculosis. He particularly stated "It is noteworthy that the appendix is only stated to be involved in 6 cases—an incidence much less common than has been found in other series. It is probable that the state of the appendix was not noted sufficiently carefully in this series as it seems unlikely that this discrepancy results from a true variation in the incidence of this condition." He has not mentioned about primary incidence of tuberculosis limited to the appendix. Boyd in his Pathology states "Tuberculosis of the appendix is usually secondary to the caecum or the fallopian tube. In rare cases the disease is primary in the appendix. It may commence in the mucosa or sub-mucosa and gradually spread till the entire appendix is destroyed, and a large peri-caecal abscess forms which may discharge into the bowel or on to the skin surface. In other cases the first lesions are seen in the mesentery of the appendix." The following case illustrates a primary tuberculosis of the appendix which has been followed for a period of 7 years after operation.

A Hindu male student, aged 19 years was admitted with a history of recurring attacks of colic in the right iliac region.

*Family History*—His mother died of tuberculosis after delivery.

The first attack occurred in June 1931, the second in October 1931, the third in February 1932 and the last was in January 1933 for which he was admitted into the hospital. On examination, the abdomen was found to be rigid in the right iliac fossa with pain and tenderness. Barium meal examination done one week after subsidence of symptoms showed nothing abnormal in the gastro-intestinal tract except slight barium residue in the region of the caecum after 48 hours. The appendix was not visualised.

Respiratory and circulatory systems were found to be normal The blood pressure was 128/72 mm of mercury The urine showed nil abnormal

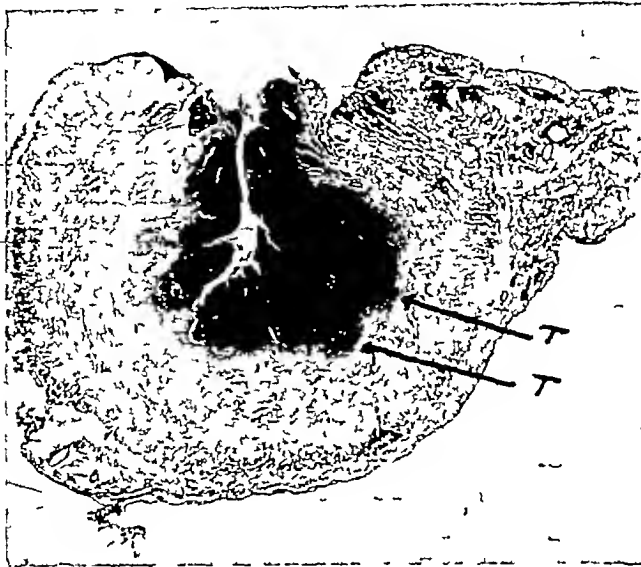


Fig 12 Photograph of the cross section of the appendix removed showing the tubercular infiltration in the sub-mucosa area indicated by the arrow mark



Fig 13 Shows the tubercle follicle with the giant cell system

In January 1933 he was operated on under spinal anaesthesia A right para-umbilical para-rectal incision was used for opening the abdomen On opening the abdomen, the appendix was found to be adherent to the posterior

abdominal wall in the fossa behind the caecum. It was removed. There were adhesions round the appendix and the vessels in the mesentery of the appendix were found thrombosed. Appendicular glands which were enlarged were removed for pathological examination. There being no other abnormalities in the abdomen, it was closed in layers without drainage.

*Pathological examination*—On removal the appendix was found to be 6 inches long. On slitting it open, there were faecal concretions in the bulbous end of the appendix. The mucous membrane showed areas of ulceration in places, the sub-mucous coat was markedly hypertrophied. There were three worms in the lumen of the appendix.

*Microscopic examination*—Histological examination of the appendix showed tubercle follicles deep in the sub-mucosa. There were typical giant cell systems with epithelioid cells and lymphocytes in a fibrillary reticulum (Fig 13). The normal lymph follicles in the sub-mucosa were displaced by the tuberculous tissue and there was a diffuse chronic inflammation which had slightly extended to the muscle coat. A small area of the mucous membrane was ulcerated. The serosa showed slight congestion but there was nothing to suggest that tubercles were found in the peritoneum. The gland showed chronic inflammatory changes with no formation of tubercles.

This patient has been followed up to date. The Lung Specialist in his report stated as follows —

*Chest*—Inspection, palpation and percussion normal. On auscultation, breath sounds normal and air entry good. Radiological examination shows lung fields to be clear, hila slightly enlarged with exaggeration of basal striation on the right side.

He is keeping perfectly fit and played foot-ball for the Medical College and is now serving with His Majesty's Forces, as a Lieut in the I.M.S.

### Points of Interest

1 A case of tuberculous appendix with no other evidence of tuberculosis anywhere in the gastro-intestinal tract localised to the sub-mucous area was found giving rise to recurrent attacks of appendicitis. A diagnosis of tubercle of the appendix was made on microscopical examination alone.

2 The patient is keeping perfectly fit with no other evidence of tuberculosis anywhere in his system seven years after operation.

3 Primary tuberculosis of the appendix is very rare and there are very few cases reported in the literature. The glands that were removed showed no tuberculous infiltration excluding primary lymphatic invasion. Was this infection haematogenous?

My thanks are due to the Pathologist Dr T Bhaskara Menon, M D , D Sc , M R C P (Lond ), for the pathological report and the micro-photographs and the Physician Dr P Arunachalam, M D , M R C P , D M R E , T D D , for his opinion regarding lung condition and the Radiologist Dr P Kesvaswami for the radiographic pictures

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# CARCINOMA OF THYROID

BY

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A patient named Khayali, aged 45 years, Pilkhana, Aligarh, was admitted on 21-9-41 with the following complaints —

- (1) A small lump on the right side of the head in the posterior part
- (2) Another lump in front of the right side of the neck

Duration of the lump in the neck was 16 years and of that on the scalp 4 months. For the last six months the patient has noticed that the lump in the region of the neck has been slightly increasing in size. Four months back he noticed a small lump appearing on the right side of the head above the mastoid region. This lump has been causing him intense pain and headache. He was gradually losing weight and getting vague pains all over the back and front of the chest.

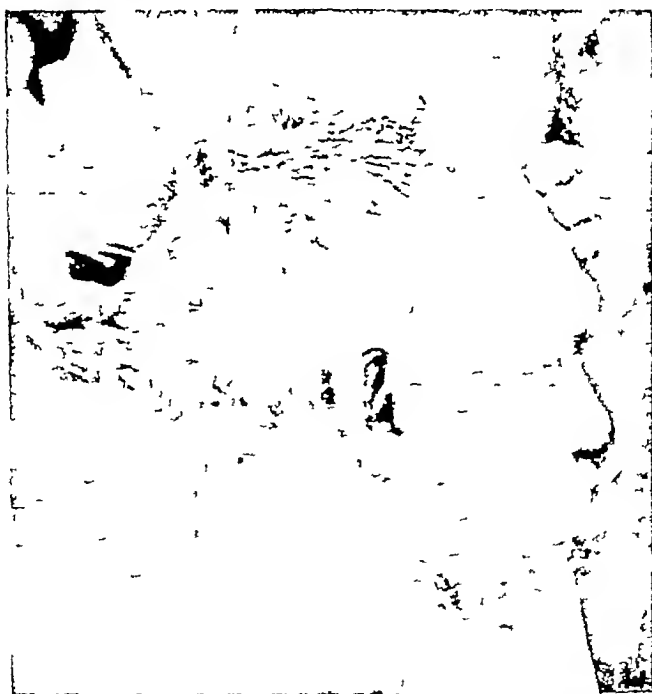


Fig 14. Case of secondary metastasis in the skull behind the right ear, from carcinoma thyroid, (lump removed from the right ear of neck)

On physical examination the lump on the head was hemispherical in shape within an area of  $1\frac{1}{2}'' \times 1\frac{1}{2}''$  above the mastoid region behind the right

ear It was soft and fluctuant to feel, fixed to the bone which was eroded and eburnated at the margin of the swelling The swelling was tender and pulsating Skin was freely movable over the swelling

The lump in the neck was of the size of a tennis ball, to the right of the middle line It was elastic, with well defined outline and moved up and down on deglutition The right carotid vessels and sternomastoid muscle were displaced to the right The left lobe of the thyroid appeared to be normal

The respiratory, circulatory and alimentary systems were normal The patient had slight cough with expectoration

X-Ray of Skull—Right lateral view showed general osteosclerosis and thickening of the skull bone—there were multiple areas of bone erosion These areas were irregular in size and punched out in appearance

Diagnosis of secondary metastasis from Carcinoma of the Thyroid in the skull was made

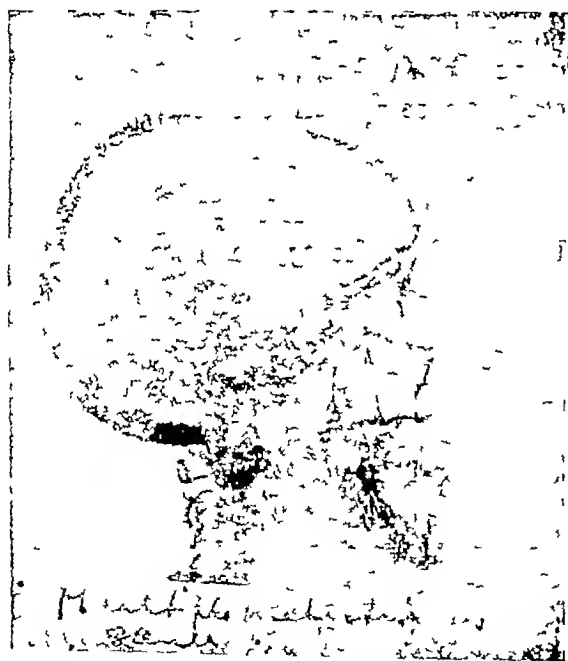


Fig 15 Multiple metastases in skull



Fig 16 Metastases in ribs

Chest skiagram P A erect was also taken and the 5th and 9th left ribs and the 4th, 6th, 7th and 8th right ribs showed expansion and erosion probably due to metastatic deposits

X-Ray of Pelvis A P showed multiple secondary deposits on both sides Report on Dorsolumbar spine and sternum was inconclusive

To confirm the diagnosis of secondary metastasis from Carcinoma of the Thyroid, I decided to remove the lump in the neck and get its microscopic examination done. The lump in the neck appeared to be a pure and simple adenoma of the thyroid on physical examination. Operation was done under local anaesthesia and a collar incision was made. The lump was enucleated without any difficulty from its thick capsule. There were no adhesions around and the blood supply of the area was also not much and consequently the bleeding during the operation was minimum. After sewing the platysma, Michel's clips were applied to the skin.

On cutting into the tumour, it was found to contain a brown coloured fluid within a cavity about an inch in diameter. There were small projections from the wall towards the cavity, almost the whole surface of the wall surrounding the latter was rough and shaggy.

The histological report is as follows —

*Adeno Carcinoma of Thyroid or malignant adenoma with invasion of veins at places*

The wound of the neck healed by first intention. The patient still complained of vague pains on the upper part of the back, shoulders and front of the chest. He got severe cough with expectoration occasionally blood stained.

Deep X-Ray therapy was advised but the patient left the hospital. The secondaries react very favourably to Deep X-Ray Therapy in cases of Carcinoma Thyroid.

There are no characteristic early symptoms and signs of malignant disease of the thyroid and this accounts for the frequency with which the disease is not diagnosed clinically but is recognised only on histological examination.

Progressive increase in the size of the thyroid gland which is already enlarged but has been stationary is often an important sign. In this case the lump in the neck had slightly increased in size, during the last 6 months. Pain referred to the side of the neck and head is an important symptom which was present in this case. When the tumour penetrates the capsule specially on the medial aspect the larynx and Trachea becomes involved and fixed, it may be displaced, compressed or invaded. The infrahyoid muscles and later the skin becomes involved in the growth. One or both laryngeal nerves become paralysed and involvement of the pharynx or oesophagus may account for the dysphagia which should raise a suspicion of malignancy. None of these symptoms were present in this case, the Carcinoma was completely encapsulated and non-adherent to surrounding structures. Macroscopi-

cally there was not the least doubt about its benign nature and its easy enucleation was astonishing

There were no symptoms of thyrotoxicosis as are some times present during the course of the disease



Fig 17 Metastasis in right Ischial tuberosity



Fig 18 Microphotograph of the Tumour removed from the Thyroid

The regional lymph glands were not enlarged, probably because the capsule was not involved by the Carcinoma. There was some suspicion of metastases in the lungs as the patient had cough and for a few days brought out blood in his sputum. The metastases in the bones was the chief feature indicating Carcinoma of the Thyroid in this case. The other sites of metastases were the pelvis and ribs, besides the skull. Pain in the long bones, was not complained of, so they were not X-Rayed.

The metastases in the skull were multiple as the skiagram shows, and only at one place it had enlarged into a tumour outside. The latter was pulsating which is very characteristic of the thyroid carcinoma metastasis.

In the majority of cases the malignant growth develops in a thyroid which is already the seat of colloid or adenomatous goitre and for this reason Cancer of the thyroid is more common in regions where goitre is endemic. Malignancy never occurs in cases of primary toxic goitre, but toxic symptoms may develop in association with malignant disease during the early stages. The tumour may be circumscribed as was found in the present case, or may involve the gland diffusely.

Allen Graham (Cleveland) from histological studies of a large series of cases recognises the following types —

(a) Scirrhus carcinoma, (b) Papillary adenocarcinoma, and (c) Malignant adenoma—90%, this high figure is accounted for by the particular variety of goitre which preceeds malignant disease in America

(a) Scirrhus Carcinoma is small, very hard, fibrous and fixed and spreads diffusely by direct extension and invades surrounding structures specially larynx and Trachea Regional lymph glands in the posterior triangle get enlarged and also those in the superior mediastinum, there is excess of fibrous tissues in interspersed small masses or strands of epithelial cells Dunhill says that this type is very infrequent

(b) Papillary Adenocarcinoma includes those cases developing in the walls of the adenomatous cyst These are tumours of low grade malignancy and extend by penetration of the cyst wall Metastases occur only in regional lymph glands Dunhill says one can not say with certainty where normal tissue ended and tumour tissue began Incidence of this type is 24%

(c) Malignant Adenoma—Graham believes that 85% of cases of thyroid cancer originate in adenomata, the naked eye appearance and the rate of growth of tumours is extremely variable Some are nodulated, hard, irregular and grow rapidly to a very large size, others are small, circumscribed and may not be detectable on ordinary clinical examination as was the condition in the present case By examination of the lump in the neck, no one could diagnose it as a case of Carcinoma unless the metastases in the skull were examined The regional lymph glands were not enlarged in this patient because the capsule and the surrounding gland was not invaded by Carcinoma The chief and most important mode of metastasis of this group, is by the blood stream and it is important to recognize that metastasis may occur while the tumour is small and still encapsuled The same was truly depicted in this case The veins were invaded by the tumour at places (seen microscopically), the Carcinoma arose in the adenoma which was completely encapsuled and small and extensive metastases had taken place through the blood stream into various bones of the body, the skull, ribs, pelvis and probably in the spine also

The histological appearances of this group of tumours are extremely diverse and they are not always uniform in the same tumour In some parts there may be little indication of malignancy and the appearances may be those of a foetal or colloid adenoma In other parts the cells may be disposed in acini or in solid masses or they may have a papillary arrangement In the less differentiated types the tumour may resemble a round or spindle-celled sarcoma As a means of differentiation between a simple and malignant adenoma Graham lays great stress upon the recognition of erosion or invasion of veins He regards gross erosion of vessel walls and the finding

of tumour cells in the lumen of veins as the most valuable criteria of malignancy. This leaves no doubt about the microscopic diagnosis of the tumour shelled out of the thyroid gland in this case, which to all practical purposes, seemed to be benign.

Dunhill says that the morphological appearance of the epithelium might vary greatly in simple tumours. The very beginnings of malignancy have to be recognised and for this one has to depend on good histology.

He says malignant adenoma was not a perfect term. It was intended to convey a malignant transformation while the tumour yet maintained in some respects the morphological characters of an adenoma. This type of Carcinoma constituted a high percentage of the total number—85 to 95%. Benign adenoma differed from one another. Some were composed of anastomosing columns of cells, in others differentiation had occurred and the tumour consisted of follicles. When malignant transformation took place these ancestral characteristics were maintained to a considerable extent though its differentiation was ultimately lost and the cells grew in a disorderly fashion presenting an appearance called Medullary and many authors have given that name to it.

The chief peculiarities of this case are, the nature of the tumour of the thyroid which was encapsuled with a small cyst inside, with no enlargement of the regional lymph glands through the veins in the section of the tumour showed invasion by carcinomatous tissue, and extensive metastases into the bones of the skull, ribs and pelvis. This case is reported because Carcinoma of the Thyroid is rare even in endemic areas in India.

I am thankful to Dr H R Bhatt, FRCSE, DMR & E, for the Skiagrams and to Dr P N Wali, MD, MRCP (Lond), Professor of Pathology for the Photo-micrograph.

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# MALARIA AND ANKYLOSTOMIASIS MIMICKING APPENDICITIS

BY

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AND

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In these parts Malaria and Ankylostomiasis are endemic, and cases of all degrees of intensity have come to us for treatment. Some of these cases simulating appendicitis are of particular interest to the surgeon. We have often met with cases where the picture is highly suggestive of an attack of Acute Appendicitis. These cases have shown all the signs of Acute Appendicitis and the question arises whether to operate on such cases or to wait. The surgeon will be on the horns of a dilemma in the face of acute signs on the one hand and the presence of Malarial Parasites on the other. To wait may mean certain death, due to perforation, or to operate may mean death due to shock, as the patient is seen to be acutely ill. In one case, noted below, we had not time enough to make the routine examinations of stools as he had all the signs of an obstructive appendicitis and a slough at the tip of the appendix was seen at operation. In this case delay should have resulted in grave danger to the life of the patient. In another case of Malignant Tertian infection the patient came with acute abdominal pain, distention and constipation with a mass in the right iliac region. In this case we put him on Oschner-Sherren treatment and antimalarial treatment. The patient got well. The mass disappeared now after two months. There have been other subacute and chronic cases where we had definite signs of appendicitis side by side with ankylostoma infection and malaria. In these cases after appropriate treatment for the infection the patient has responded well and the pain has disappeared. In such cases would it not be advisable to operate and remove the appendix? These are the problems that face a surgeon in these districts. The object of the paper is to elicit the opinions of other surgeons who have been faced with similar situations.

## Case Reports

Case 1—Adult aged 25 years came with a history of acute pain in the abdomen. Duration 36 hours. He gave a typical history of an attack of appendicitis and on examination he presented a picture of obstructive appendicitis. His temperature was normal. Pulse 80 per minute. Leucocytes 7000 per C Mm. There was localised rigidity of the right iliac region. Operation

was decided on and an appendectomy was performed through a McBurney incision. The appendix was found to be pelvic in position and there was a mild localised peritonitis. Near its tip there was a small slough. The appendix was itself inflamed.

Patient was recovering quite normally when on the 14th day he suddenly developed an acute colic in the abdomen. A detailed examination did not point to any of the surgical conditions. After an enema he passed a good quantity of stool. On examination the stool showed plenty of Ova of *Ankylostoma Duodenalis*. Patient was put on the usual treatment for ankylostomiasis and he progressively improved. He had two more milder attacks of colic. It was decided to have a radiogram taken but he refused and got discharged. Subsequently he has reported himself and he is free from all attacks. Stool examinations before he was discharged did not show any ova. He is a local man and has reported recently saying that he has had no more such attacks.

*Case 2*—A boy aged 16 years, was admitted with acute pain in the right side of the abdomen—more localised in the right iliac region. He gave a history of fever for the last fortnight and was being treated for malaria. As the pain increased and the temperature did not subside, he was advised by the attending doctor to go to the hospital as in his opinion he might need an operation for appendicitis. On admission the patient had a temperature of 99°F, pulse 96 per minute, respirations 24 per minute. There were no objective signs in the lungs. The right half of abdomen was tender and rigid. The spleen was palpable to 3 fingers' breadth below the costal margin. Patient had a slight icteric tinge.

*Stool examination*—Ova of *ankylostoma duodenalis* were found in plenty. Blood smear—MT Rings and crescents were found. W.B.C. count—8000 per C.Mm.

He was appropriately treated for malaria and when his condition improved was treated for ankylostomiasis. He was discharged definitely cured of his pain and he showed no malarial parasites in his blood or ova in the stools.

*Case 3*—Boy aged 16 years was brought with acute abdominal pain. Duration 12 hours. He had no history of vomiting. On admission temperature was normal, pulse 72 per minute, respirations 18 per minute. No objective signs in the lungs.

*Local examination*—There was tenderness in the right half of the abdomen but no definite tenderness in any particular region. Patient was given an enema after which he felt much relief. He was kept in the hospital for observation and the next morning his condition was better and the tenderness was not so marked.

*Stool examination*—Ova of ankylostoma duodenalis and ascaris lumbracoidis were found After the usual treatment he was discharged cured of his pain and did not show any ova in the stools when he was discharged

*Case 4*—An old man aged about 60 years came with vague symptoms of "Indigestion" and loss of appetite Duration 3 months He gave a previous history of malaria and dysentery On examination there was tenderness on palpation in the right iliac region Gastric analysis showed a low acid curve

*Stool examination*—Plenty of ova of ankylostoma duodenalis The patient was given the first course of treatment for ankylostomiasis He felt relieved and so he got discharged

*Case 5*—An adult male aged 35 years was admitted with acute pain in the abdomen, distention and constipation He gave a history of malaria and he was being treated by a local medical practitioner The medical attendant said that malignant tertian rings were found in the blood and that he was treating him for malaria He said that the patient developed acute abdominal pain and distention 12 hours prior to admission. On admission his temperature was 99°F, pulse 90, and respirations 20 per minute

*Local examination*—Abdomen was distended uniformly ,On palpation there was tenderness on the right half of abdomen. Blood MP not found WBC count 10,000 per C Mm Stool No cysts and no ova found Urine Nothing abnormal An enema was given with good result but the distention continued A flatus tube was passed and retained for 24 hours An injection of pitressin  $\frac{1}{2}$  c c was given and repeated once in four hours during the first 24 hours, and also turpentine stupes to the abdomen Glucose 25% 10 c c was given intravenously At the end of the first 24 hours the temperature which had risen had come to normal Abdomen became flaccid Most of the flatus had escaped through the flatus tube An enema was given with good result WBC count again on the third day was 6000 per C Mm Blood smear showed malignant tertian rings and crescents Patient was treated for malaria and his temperature became normal He is having a good normal bowel motion naturally The abdomen has been continuously flaccid except for a little resistance to palpation in the right iliac region

*Case 6*—Adult Age 60 years History of pain in the abdomen for the last two years On examination signs of chronic appendicitis found Motion examination revealed plenty of ankylostoma duodenale ova He is under treatment and is improving

Our thanks are due to Dr K Ramashastry for his valuable assistance

---

# FACIAL ERYSIPELAS—REPORT OF A CASE

BY

N A AIENGAR, L R C P, M R C S, S T PARTHASARATHY, M B B S,

AND

S GUNDA RAO, L M P,

SRI CHAMARAJENDRA HOSPITAL, HASSAN

Mr R aged 42 years

*Complaint*—Pain and swelling of the nose and fever Duration—3 days.

*Previous History*—The patient had been treated for polypus of the nose about a year ago

*History of the present complaint*—The patient developed a furuncle of the nose near the tip which he scratched inadvertently The swelling of the nose increased subsequently As advised by some of his friends he applied a paste of red mud on the nose for a day The swelling did not improve He consulted a practitioner and got himself admitted to this hospital for treatment

On admission the patient had 100 8° temperature Pulse 88 per min. Respirations 22 per minute There was a furuncle near the tip of the nose and a reddish swelling of the nose was visible The patient was conscious

*2nd day*—The swelling had increased It had involved the right eyelids and the ridge of the nose During this time he had 20 c c of antistreptococcal serum I M and 15 c c of urea sulphazide (U D C) in addition to septanilum tablets by mouth, two tablets three times a day Temperature remained at 100 2° He had local applications of Tr Ferri perchlor

*3rd day*—Condition much the same The angular vein in either side was ligatured Prontosil Rubium soluble 10 c c was given I M and antistreptococcal serum continued Oral administration continued

*5th day*—The patient appeared better The swelling had become localised and was declining The reddish appearance had disappeared The treatment was continued as on the previous day

*6th day*—Patient's general condition deteriorated Delirium set in. Pulse rate 120 per minute with subnormal temperature The patient developed distention of the abdomen which persisted till the end in spite of treatment Turpentine stupes gave temporary relief Pituitrin 1 c c and Pitressin  $\frac{1}{2}$  c c given once in two hours alternately had no effect Flatus tube and high turpentine enema had no effect apart from a temporary relief The paresis of the intestines continued and the patient passed away on the 7th day after admission

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**ANNUAL MEETING** It has been decided, after consultation with the members of the Governing Body, to postpone the Annual Meeting which was proposed to be held at Hyderabad in February, 1943. The date of the next meeting will be decided later.

\* \* \* \* \*

## SUBJECTS FOR DISCUSSION

### 5th Meeting

- 1 Laryngeal Carcinoma by Dr H D Gandhi and Dr S G Joshi, Bombay
- 2 Injuries of the Thorax by Dr C S Patel, Bombay
- 3 Surgery of the Gall Bladder by Dr P Chatterjee, Calcutta

### 6th Meeting

- 1 Traumatic Surgery of the Skull by Dr R N Cooper, Bombay
- 2 Carcinoma of the Breast by Dr N C Joshie, Delhi
- 3 Urinary Lithiasis by Dr L B Joshi, Karachi

### 7th Meeting

- 1 Carcinoma of the Rectum by Dr C P V Menon, Madras
- 2 Enlarged Prostate by Dr S R Moolgavkar, Bombay
- 3 Fractures of the neck of the Femur by Dr B N Sinha, Lucknow

### 8th Meeting

- 1 Carcinoma of the Cheek by Dr B M. Joly, Delhi
- 2 Tuberculous disease of the Spine by Dr S P Srivastava, Agra
- 3 Hare Lip and Cleft Palate by Dr S C Sinha, Calcutta

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C P V MENON

The Editorial Staff regret the delay in the appearance of this Issue, which has been due to the difficulty in obtaining the right type of paper and the scarcity of material

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# THE INDIAN JOURNAL OF SURGERY

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MARCH 1943

No 1

## REMOVAL OF GALL-STONES

(Ayurveda)

BY

L A RAVI VARMA

Conditions having colicky pains as the dominant symptom are, in Ayurveda, grouped together under the general category, 'Gulma,' differentiation being achieved by the addition of qualifying terms, 'vata,' 'pitta,' etc, when required. The word 'Gulma' means 'a cluster of shrubs' and hence any cluster or mass. Ayurveda recognises that the essential pathology is the same in all classes of colics, Vata factor or the irritation of nerve-endings and its sequelae forming the predominant pathological feature. Vagbhata expresses pathological process as —

“ कर्शनात्कफविट्पित्तैर्मागस्यावरणेन वा  
वायुः कृताश्रयः कोष्ठे रौक्ष्यात्काठिन्यमागतः  
स्वतत्रः स्वाश्रये दुष्टः परतत्रः पराश्रये  
पिंडितत्वादमूर्तोऽपि मूर्तत्वमिव संश्रित  
गुल्म इत्युच्यते वस्त्रिणाभिहृत्यार्धसश्रयः ॥”

(A Hr Nid xi 38-40),

The same is expressed by Caraka as —

“ विट् श्लेष्मपित्तातिपरिस्रवाद्वा तैरेव परिपीडनाद्वावृद्धैः  
वेगैरुदोर्गेर्विहितैरघो वा बाह्याभिघातैरतिपूरणैर्वा  
रूक्षान्नपानैरतिसेवितैर्वा शोकेन मिथ्याप्रतिकर्मणा वा  
विचेष्टितैर्वा विषमातिमात्रैः कोष्ठे प्रकोपं समुपैति वायुः

कफ च पित्तं च स दूषयित्वा प्रोद्धूय मार्गान् विनिबद्धय ताम्ब्याम्  
हृन्नाभिपार्श्वोदरवस्तिशूल करोत्यधो याति न वद्धमार्गः  
पक्काशये पित्तकफाशये वा स्थितः स्वतन्त्रः परसंश्रयो वा  
स्पर्शोपलभ्य. परिपिण्डितत्वात् गुल्मो यथादोषमुपैति नाम ॥”

(Car chik v 4-7)

“Due to inspissation (कशेनात्) of mucus, faeces, secretions like bile, or due to stenosis of passages (मार्गस्यावरणेन), the nerve endings on the walls of the affected viscus (वायु कृताश्रय कोष्ठे) get irritated causing the walls of the viscus to contract and harden (रौक्ष्यात्काठिन्यमागतः). This nerve irritation may be confined to the affected viscus alone (स्वतन्त्र. स्वाश्रये दुष्ट) or may extend to continuous and contiguous structures (परसंश्रयो वा) Though Gulma is not a real tumour, strong contractions of the muscular walls may make a gulma feel as a tumour-like mass (अमूर्तोऽपि मूर्तत्वमिव सञ्चित Vag, स्पर्शोपलभ्य परिपिण्डितत्वात् Caraka) This is called Gulma, it may be located about the lower abdomen (vasti, uterine colics mainly), about the umbilicus (nabhi, intestinal colics including appendicular), sub-costal regions (gastric<sup>1</sup> and gall-bladder conditions), or on the flanks (renal) ” Caraka has, in his description, included the aetiology of colics as well They are “excessive evacuation of faeces, mucus or bile, excessive production of the same and consequent pressure on the walls of the viscus, powerful excitation of peristalsis while the passage remains obstructed, injuries from outside, irritating or excessive food, mental worry, contra-indicated medications (such as medicated enemata when contra-indicated), contortions of the body or inordinate physical straining These cause irritation of the nerve endings on the walls of the viscus leading to the production of the condition, gulma ”

Among such gulmas one is known as ‘pitta-gulma’<sup>2</sup> (biliary colic) whose symptoms are —

“पित्तात्-दाहोऽम्लको मूर्छा विड्वधस्वेदतृड्ज्वराः  
हारिद्रत्वं त्वगाद्येषु गुल्मश्च स्पर्शनासहः  
दृयते दीप्यते सोष्मा स्वस्थानं दहतीव च ॥”

(A Hr Nid xi 44 et seq)

<sup>1</sup> Hrit or hridaya, in ayurveda often stands for the ‘pit of the stomach Cf English terms like ‘heart-burn’

<sup>2</sup> Susruta includes duodenal ulcers under pitta-gulmas on the ground that they are caused by derangement of secretions Vide also susruta, sutra xxi 9

(When due to pitta, there may be heart-burn with acidity, faintings, constipation,<sup>3</sup> sweating, thirst, rise of temperature, icterus of skin, etc., tenderness and pain on palpation and deep burning pain at the spot)

Ayurveda advocates the following general lines of treatment for gulmas —

“ .. .... स्वेदमाचरेत्  
 आनाहवेदनास्तंभविबंधेषु विशेषतः  
 स्रोतसा मार्दवं कृत्वा जित्वा मारुतमुल्बणम्  
 भित्त्वा विबधं क्षिग्धस्य स्वेदो गुल्ममपोहति  
 स्नेहपानं हितं गुल्मे विशेषेणोर्ध्वनाभिजे  
 पक्वाशयगते वस्तिरुभय जठराश्रये ॥”

(A Hr Chik xiv 2-4)

“In all gulmas, and in particular, in cases having tympanitis, pain, rigidity of abdomen or extreme constipation, fomentations (स्वेद) may bring about relaxation of the walls of the passages (स्रोतसां मार्दवं), control excessive peristalsis (जित्वा मारुतमुल्बणम्), overcome constipation by relaxing spasms (भित्त्वा विबधं) and effect a cure of the condition. In all cases, and especially in those affecting the upper regions of the abdomen (विशेषेणोर्ध्वनाभिजे), oily substances by mouth, in those affecting the large intestines, oily enemata, and both, in cases where the abdomen as a whole is involved”<sup>4</sup>

After giving a number of formulae for ingestion, enemata, etc to meet the various general and specific requirements, an operative procedure is recommended for biliary colics. Preliminary enemata and fomentations are urged as essential before operation.

“ सर्वत्र गुल्मे प्रथमं स्नेहस्वेदोपपादिते  
 या क्रिया क्रियते याति सा सिद्धि न विरूक्षिते ॥”

<sup>3</sup> This is the reading in some of the mss I had access to. Some printed books have the reading “विह भेद” = diarrhoea. As diarrhoea is rarely seen with colics, the reading “विह भेद.” may be considered as incorrect.

<sup>4</sup> Cf use of olive oil in biliary and gastric troubles, also retained enemata of ol. olv. in troubles of large intestines.

The operation is as follows. —

“ स्निग्धस्विन्नशरीरस्य गुल्मे शैथिल्यमागते  
यथोक्ता घटिकां न्यस्येद्गृहीतेऽपनयेच्च ताम्  
वस्त्रांतरं ततः कृत्वा छिद्याद्गुल्मं प्रमाणवित्  
विमार्गजं यदा पश्येद्यथालाभं प्रपीडयेत्  
प्रमृज्याद्गुल्ममेवैकं न त्वन्त्रहृदयं स्पृशेत् ॥”

(A Hr Cik. xiv 84-96)

“ स्निग्धस्विन्नशरीराय गुल्मे शैथिल्यमागते  
परिवेष्ट्य प्रदीप्तांस्तु बलवजानथवा कुशान्  
भिषक्कुम्भे समावाप्य गुल्मं घटसुखे न्यसेत्  
संगृहीतो यदा गुल्मस्तदा घटमथोद्धरेत्  
वस्त्रान्तरं ततः कृत्वा भिन्द्याद्गुल्मं प्रमाणवित्  
विमार्गजं यदा पश्येद्यथालाभं प्रपीडयेत्  
मृद्नीयाद्गुल्ममेवैकं न त्वन्त्र हृदयं स्पृशेत् ॥”

(Car Cik v 135-136)

“After the preliminary measures as fomentations and enemata, and when, as a result of these measures, the colic is fairly overcome, (गुल्मे शैथिल्यमागते), ‘ghata-yantra’ is ‘fired’ and applied to the viscus. When it is firmly sucked up by the yantra, the viscus is lifted out with the help of the yantra and walled off from the surrounding structures (to avoid soiling when the viscus is opened) and opened by an incision the size of which is determined by a knowledge of the size of the material to be brought out through the opening (प्रमाणवित्, the knowledge of the size of the stones is gained by palpation, no doubt). When the material arising in the wrong place (विमार्गजं = foreign body) comes into view (विमार्गजं यदा पश्येत्) it should be squeezed out (‘milked’ out) till it is delivered through the opening made on the viscus (यथालाभं प्रपीडयेत्). The intestines or the stomach should not be handled”

There is some difference in reading to be found in the various editions. The reading “विमार्गजं यदा पश्येत्” is the one accepted by Gangadhara and is also seen in many Kerala Mss. Some of the printed texts read “विमार्गजपदादर्शे.” Arunadatta takes the terms ‘vimarga,’ ‘ajapada,’ and

'adarsa' to mean certain instruments From the negative evidence to be deduced from his annotation, Chakrapanidatta does not seem to countenance the reading "विमार्गाजपदादर्शैः". He simply says "घटमन्थनयन्त्रेण सम्यग्गृहीत्वा प्रपीडयेत् सिन्ध्यात् इति योजना". This means, a phrase like "विमार्गाजपदादर्शैः" difficult to understand, was not before the annotator, if the version was the one before him he certainly would have annotated it. Again these terms as names of instruments are not met with in either medical works or in lexicons. Further, if the terms are construed to mean certain instruments, the verb sense of the phrase "यथालाभ" will be left without any object for it. To get what? This will remain unanswered. The original text appears to have got badly mutilated, a wider search than is possible at the moment is required to reconstruct the text in its real and original form. The reading "विमार्गाजपदादर्शैः" is evidently wrong, the nearest approach to the original, at least in sense, seems to be the reading "विमार्गाज यदा पश्येत्".

Ghata-yantra is a pot like contrivance in which something is burnt to produce a partial vacuum so as to cause a sucking effect when applied to any part. The principle is the same as in 'cupping' after burning alcohol in the 'cup'. This contrivance is used here to hold and lift up the fundus of the gall-bladder. The description given does not contain any mention of opening of the abdomen at the beginning or its closure at the end of the operation. This is not a serious omission as any tyro in medicine could make it out without specific mentioning. The pointed direction not to handle the stomach or the intestines is sufficient enough to show that one is dealing with an intra-abdominal operation here. The direction to remove by 'milking' what may come into view on incising the viscus, is characteristic enough to point to the removal of a 'foreign body' from the opened viscus. And as there is the interdiction, not to handle the stomach or intestines, the only other hollow viscus that could be attacked in the region turns out to be the gall-bladder. Further, the mention of jaundice among the signs of the diseases for which the operation is recommended, as well as the name of the disease as 'pitta-gulma' show that the disease is gall-stone colic. Therefore the operation described can be no other than removal of gall-stones from the gall-bladder as a cure for gall-stone colic.

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# A NOTE ON THE LENGTH AND MOBILITY OF THE PELVIC COLON IN SOUTH INDIANS

BY

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AND

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It has been frequently noticed in the course of dissections in the Central Institute of Anatomy, Madras, that there is a marked disparity between the text-book description of the pelvic colon and the actual observation regarding its length and mobility. This study has been made to determine the extent and frequency of the disparity and to give an idea of the average length and mobility of the pelvic colon in the South Indian subject. Some points of surgical interest arising from these observations are also briefly considered.

The pelvic colon forms a loop of very variable length. The average length as given in some of the familiar text-books measures variously, as indicated below, from 15 to 18 inches.

<i>Name of book</i>	<i>Length of pelvic colon</i>
Gray's Anatomy, 28th ed., 1942	16 inches
Text-book of Anatomy, Cunningham, 7th ed., 1937	16 "
Cunningham's Practical Anatomy, 10th ed., 1940	15 "
Surgical Applied Anatomy, Treves, 6th ed., 1916	17½ "
Operations of Surgery, Rowlands and Turner, 7th ed., 1927	16 to 18 inches

The mobility of the pelvic colon might be considered to be dependent on the length of the loop and the depth of its mesentery. The depth of the pelvic mesocolon, *i.e.*, the measurement from its root to its colic attachment, is a maximum about the middle of the loop and diminishes towards the ends where it disappears. The average of the maximum depth of the mesocolon is given as 3½ inches (Piersol's Human Anatomy, 1930).

## Material and Observations

The present study has been made on thirty unselected dissection subjects. Thirty bodies consecutively issued for student's dissections have been utilized. The measurement of the pelvic colon was taken by means of a

tape adjusted along the convexity of the loop to give the length of the bowel between the brim of the pelvis, *i.e.*, the point where the pelvic colon commences, and the third piece of the sacrum, *i.e.*, the point where it terminates in the rectum. The measurements are given in Table I. The average is 9 inches. There was one exceptional specimen of 19 ins., all the others fell within the range, 4 ins. to 13 ins.

The maximum depth of the pelvic mesocolon is to a large extent proportionate to the length of the loop. These measurements are also given in Table I. The average is  $2\frac{1}{2}$  inches.

TABLE I

Serial No	Length of pelvic colon in inches	Depth of mesocolon in inches	Serial No	Length of pelvic colon in inches	Depth of mesocolon in inches
1	19	4	16	10.5	2.5
2	8.5	2	17	8	1.5
3	4	0.5	18	6	1.5
4	12	2.75	19	9.5	4
5	8	2.5	20	4.5	0.0
6	7	2	21	10	3
7	11	3	22	7	1
8	6	1.5	23	12	5.5
9	13	3.5	24	8	3
10	8	2	25	13	4
11	7	2	26	13	4
12	7	2	27	11	4
13	7	2	28	11	2
14	4	0.0	29	7	0.5
15	10	2	30	12.5	2
Average calculated from thirty measurements				9 inches	2.5 inches

### Comment

It might be contended that the condition in the formalin preserved dissection room subject is likely to be different from that in the living individual. While admitting this, it has to be mentioned that the difference is probably only slight. The measurements given in anatomical text-books also happen to be derived from preserved and hardened material. Compared with such data the pelvic colon of the South Indian appears to be relatively short. The only other study of Indian material, made by Pan (1910, J. Anat. Vol. 54)

on the Gastrointestinal tract of Hindus, makes no specific mention of the length of the pelvic colon. He has measured the total length of the large intestines and finds that the large intestines are slightly shorter in Hindus (of Bengal)

The pelvic colon is one of the common sites where volvulus is liable to occur. This predisposition to twisting partly depends on the great length of the loop and its mesentery. The shortness of the pelvic colon and its mesocolon in the South Indian would predispose to a lesser frequency of volvulus.

Another point of interest to the surgeon in cases where the pelvic colon is short and less mobile, is that it could not be brought to the anterior abdominal wall for a colostomy opening without undue tension. Though in the great majority of cases the mesentery of the sigmoid flexure is sufficient to allow of the bowel being well drawn up in the wound and safely fixed without tension, yet in about 3 to 4 per cent (Rowlands and Turner, 1927, *Operations of Surgery*, 7th ed) of cases this is not so, the bowel being bound to the posterior parietes. In such cases the surgeon necessarily has to mobilize the bowel by incising the parietal peritoneum some distance external to the colon. From the findings obtained in this study, it would be justifiable to infer that cases requiring such mobilization of the bowel are certainly likely to be more than 3 to 4 per cent among South Indians.

It is usually expected that the intestinal canal in people living on a bulky, predominantly carbohydrate, diet would be relatively longer than that of others not accustomed to such food. The analogy of the long intestinal tracts of herbivorous animals is often cited as plausible evidence. But the observation made in this paper runs contrary to this expectation. The evidence drawn from comparative anatomy does not seem to have much relevant value, as vegetarian man takes cooked cereal food as contrasted with the raw vegetables taken by the herbivorous animals. Perhaps among many factors influencing the length of the pelvic colon, more important than the nature of the diet are the habits and posture of defaecation and the completeness or otherwise of the evacuation periodically obtained.

Though the exact nature of the determining factors remains purely speculative, the relative shortness of the pelvic colon and its mesocolon in the South Indian seems to be a factual observation that is worthy of note.

### Summary

The pelvic colon in the South Indian subject is relatively short. Its average length is 9 inches. Making allowance for exceptions, as a rule, its range varies from 4 to 13 inches. The depth of its mesocolon from its root to its colic attachment is on an average  $2\frac{1}{2}$  inches, with a usual range from 0 to 4 inches.

# A CASE OF PLASMOCYTOMA OF THE ILIUM

BY

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This report of a case of plasmocytoma of the ilium is justified by the rarity of similar reports in medical literature. Plasmocytomas involving nonmedullary tissues have been adequately discussed by Caliborn and Ferris<sup>3</sup> and by Blacklock and Macartney<sup>1</sup>. Chesterman<sup>2</sup> has analysed twelve cases of plasmocytomas of long bones, adding one of his own. Two cases of "Single myeloma of bone" involving the ilium are reviewed by Cutler et al<sup>4</sup> and later Leedham-Green et al<sup>7</sup> have reported two cases of plasmocytoma of the innominate bone. Since we are not aware of any report of plasmocytoma of the ilium in Indian medical literature, we feel justified in recording the following case.

## Case Report

Mr V aged 35 years, a representative of a medical firm, was admitted to the General Hospital, Madras, under the care of Dr C P V Menon on 9-5-1942 for pain in the left hip of six months' duration. A year prior to admission he was operated on for acute appendicitis and three months later had received treatment for filarial lymphangitis of the upper extremity. The present illness commenced in November 1941, with pain at the back of the left hip on walking. Gradual increase of this pain caused limping two months later and the patient noticed inability to squat. On 20-3-1942, he fell down from a Jutka and received a slight injury to the left hip. About the middle of April 1942, he was able to feel a hard painful swelling of the size of a marble over the back of the left hip and at the beginning of May, the swelling became visible. Physical examination at the time of admission revealed a hard painful lump over the back of the left ilium, just below and lateral to the posterior superior iliac spine. Sacroiliac joint was free. Radiological examination pointed to a myeloma arising from the left ilium (Fig 1), all the other bones being normal. Pathological report on the material aspirated on 12-5-1942, was made by us as plasmocytoma, while the bacteriological examination showed a positive staphylococcus culture, probably from contamination. On 16-5-1942, under general anaesthesia, a vertical incision was made over the tumour by the surgeon, a thin bony shell was cut through and



Fig 1 Radiograph of the pelvis (29-6-42)

inside was a large cavity containing friable tissue and blood clot, with a definite bony shell around. Pieces were taken for microscopical examination. The cavity was scraped out completely, swabbed with zinc chloride and packed with a roll of gauze, one end of which was brought outside, closing the rest of the incision by sutures. On 2-6-1942, the gauze plug was removed. Post operative course was uneventful, wound healed almost completely and the patient was discharged on 13-6-1942 with instructions to take a course of deep X-ray therapy.

#### OTHER INVESTIGATIONS CARRIED OUT WERE

27-5-1942 BLOOD Calcium — 11.8 mgms percent  
 W.B.C — 12,000 per cmm  
 Differential count — Polymorphs 50%  
   Lymphocytes 41%  
   Monocytes 1%  
   Basophils 1%  
   Eosinophils 7%

URINE, Volume in 24 hours — 1500 c c  
 Calcium — 288.7 mgms %  
 No Bence-Jones Protein

#### Pathological Report

Plasmocytoma. Histologically the tumour consisted of plasma cells with the characteristic nuclear and cytoplasmic features (Fig 2). Moderate variation in the size of the cells was seen, but multinucleated cells and mitotic figures were very few. The stroma, made up of fine connective tis-

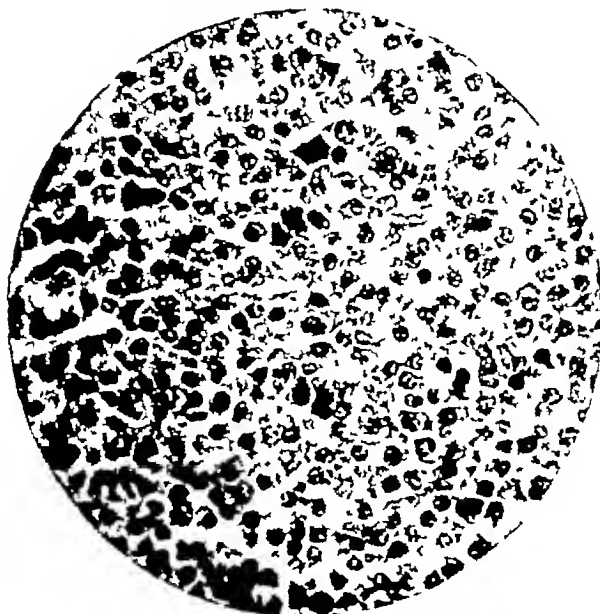


Fig 2 Photomicrograph of the section of the tumour

sue fibrils, was very scanty. In the sections of tissue removed on 16-5-1942, the growing edge appeared irregular and further away from this edge were seen perivascular collections of the same type of cells. Though it is not possible to disprove the possibility of lymphatic permeation, the appearances were highly suggestive of a perivascular origin of the tumour cells.

#### Report of the deep X-ray therapy

The first course of X-ray therapy was started on 6-6-1942 and finished on 26-6-1942 and a total skin dose of 3100r was given over this period of three weeks in eighteen fractional doses with a 200 K.V apparatus to the site of the lesion by a direct posterior field. The patient was examined radiologically after a period of two months and the lesion showed some degree of consolidation. The second course of treatment was started on 21-8-1942 and completed on 16-9-1942 and a total skin dose of 4000r was given in twenty fractional doses during this period of a little over three weeks, the technique being the same as before. The patient was examined again on 14-1-1943 and the radiograph shows considerable improvement in the local condition. It is seen that a good, dense, cortex has formed all round the lesion with dense trabeculae spreading from this cortex to the interior of the tumour area.

The patient was seen again on 14-1-1943 and on 5-3-1943. He was able to squat and to walk comfortably without limping, but complained of pain over the lumbar region. Radiographic examination of lumbar and other bones was negative and urine continued to be free of Bence Jones protein.

### DISCUSSION

The diagnosis of this case depended almost entirely on the histological characteristics of the biopsy material. There was no distinctive diagnostic feature in the radiograph of the affected bone. In the cases reported by Leedham-Green et al.,<sup>7</sup> the radiograph simulated a malignant endosteal tumour in one, and a benign giant cell tumour in the other. Negative abnormal findings in the radiographs of other bones both at the time of admission and later after an interval of ten months help to differentiate the growth from myeloma. It is still premature to completely ignore the possibility of this growth being an early localised manifestation of what might later on prove to be a multiple myeloma. However, the chances for this are very remote, as already a period of nearly 17 months have elapsed from the commencement of the symptoms to the time of the last examination. In a tabular statement by Geschickter and Copeland<sup>6</sup> concerning 33 cases of 'multiple myeloma' the duration of symptoms before the diagnosis of the tumour was one year or less in 30 cases. Of the remaining cases, case 36,174, with a history of symptoms of 8 years' duration, the femur was the only seat of the tumour at the first examination and it was possibly a plasmocytoma. Multiplicity of the tumours is mentioned as a cardinal point in diagnosing myelomas. Only 5 cases were confined to single foci in the cases surveyed by Geschickter and Copeland<sup>6</sup> but none of them was confirmed by autopsy. Again, the age of the patient and the absence of Bence Jones protein in the urine are in favour of the diagnosis of plasmocytoma. "Multiple myeloma is a disease of later life, approximately 80% of all cases occurring between the ages of 40 and 70, with a peak of incidence at 55 (Geschickter and Copeland<sup>6</sup>). On the other hand, plasmocytomas have been reported in younger individuals, at 34 by Stewart and Taylor,<sup>8</sup> at 34 (Rogers), at 29 (Shaw), at 32 (Cabot-Heffen), and at 39 (Bone Registry 1148), the last four as reviewed by Cutler et al.<sup>4</sup> Excretion of Bence Jones bodies was reported in 65 percent of all the cases of myeloma analysed by Geschickter and Copeland<sup>6</sup>. Twelve different conditions are mentioned other than multiple myelomatosis where these diseases involve bone marrow extensively. Urine was negative for Bence Jones bodies in all the proved cases of plasmocytomas, whenever the examination has been made.

There is no unanimity of opinion regarding the origin of the plasma cells of the tumour and the pathogenesis of the tumour. Stewart and Taylor<sup>8</sup> have given weighty evidence in favour of the neoplastic nature of these growths. This view is supported by Ewing.<sup>5</sup> Of the two main theories with regard to the origin of the tumour cells, (1) that they arise from the adventitial cells of the small blood vessels, and (ii) that they are derived from blood forming elements, Chesterman<sup>2</sup> points out that clinical evidence is in support of the former view. Histological evidence in our case also suggests the same origin.

The relationship between multiple myeloma and plasmacytoma is also not definitely understood. The plasma cell is the type cell in about half the cases of multiple myelomas analysed by Geschickter and Copeland.<sup>6</sup> Whether the plasmacytomas are the early localised manifestations of future multiple myelomas is a difficult question to decide. However, the long period of mild symptoms prior to the diagnosis of the tumour, the absence of any other focus of tumour for over a year and more in most of the reported cases and the comparatively benign clinical course of the tumour, point to a different pathogenesis of the plasmacytomas from that of multiple myelomas. And if the different nature of the tumour is accepted, it seems superfluous to have the adjective "solitary" to these tumours which can claim the dignity of forming a group by themselves under the heading of 'Plasmacytomas'. Cases of myeloma showing plasma cells histologically can be described as 'Plasma cell myelomas' (Ewing<sup>5</sup>) when a distinction is required from real plasmacytomas.

### Summary

1 A case of plasmacytoma of the ilium is reported

2 It is suggested that the pathogenesis of plasmacytoma is different from that of myelomas whether they are solitary or multiple

In conclusion, our thanks are due to Dr C P V Menon for helping us with the clinical history of the case and to Dr K M Rai, for the report on the X-ray therapy and the radiological report. We tender our thanks to the Superintendent of the General Hospital, for permission to report this case and also to reproduce the radiograph.

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# A CASE OF SARCOMA OF THE RECTUM

BY

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Primary Sarcoma is very rarely found in the rectum, secondary invasion is not infrequent, due to metastasis from the original growth in other pelvic organs

After having had experience of a case described below, I have been watching for an opportunity of meeting with another case no case has been seen in this hospital during the past 6 years

## CASE REPORT

A Watchman, Mohammed Kutty by name, male, aged 31 years was transferred from the Medical Wards for a painful swelling below the umbilicus of ten months' duration on 2-7-36

*Family History*—Father died 20 years ago Mother 10 years ago One brother and one sister alive

*Previous illness*—Nil.

*History of present illness*—The present illness started one year and four months ago with pain in the lower abdomen and in both hips There was much difficulty in sitting down to pass urine He was admitted into an up-country hospital where he remained for nearly two months After symptomatic treatment, pain was relieved

Six months after, patient had fever for 2 to 4 hours a day sometimes in the evenings and sometimes in the nights After a few days, he noticed a lump above the pubic region

*Condition on admission*—Weight—88 lbs Blood Pressure—115/85 Patient is emaciated, not anaemic, skin dry, temperature normal, lymphatic glands not enlarged, cardio-vascular and respiratory systems normal

*Alimentary system*—Appetite is good, Bowels not regular, since two days he is passing blood in the stools

*Local examination of the Abdomen*—There is a well-marked swelling in the hypogastrium extending to the left iliac region. On palpation, the swelling is felt slightly movable from side to side Fluctuation was not elicited. There is no increased local temperature Liver and spleen are not palpable The area is resonant to percussion. There is no distinct dullness anywhere Nothing is heard over the region on auscultation

*Investigations*—7-7-36 Urine examination was normal Motion contained blood

12-7-36 Blood and Mucus in motion, examination for organisms was negative Barium meal examination showed no obstruction in the alimentary tract Rectal digital examination did not reveal any enlargement of Prostate or any growth within reach of the finger

Barium Enema passed in easily and radiographs both before and after evacuation did not reveal any abnormality

Sigmoidoscope could be passed easily and, although ulceration was noticed, the true nature of the condition was not recognised

Intravenous uroselectan did not show any abnormalities

Patient was operated on, on 15-7-36 under spinal anaesthesia supplemented by gas and oxygen and open ether anaesthesia towards the end. Abdomen was explored, a large growth of the sigmoid colon with adhesions to the Ileum and omentum was ligatured and excised. The Sigmoid colon was removed with the meso-sigmoid. The terminal portion of the rectum was closed below external to the (pelvic) peritoneal cavity, the proximal portion of the rectum was removed with the sigmoid. The proximal part of the gut was brought out as a terminal Colostomy. The peritoneal floor was reformed, a drainage tube being left in. Continuous intravenous glucose saline by the drip method was administered after operation. He died the same day of shock, 7 hrs after operation. A one-stage procedure was adopted as there was no obstruction.

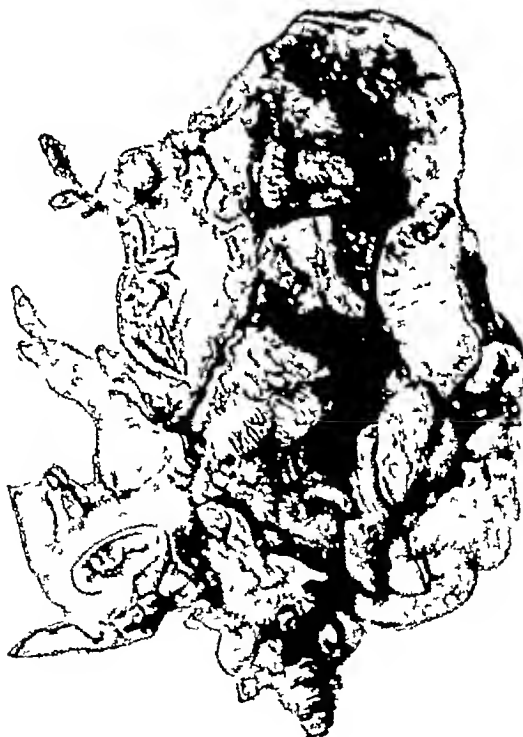


Fig 3 Sarcoma of the Sigmoid Colon

Naked eye description of the Specimen preserved in the Madras Medical College Pathology Museum Section No 1368/36 Growth Sigmoid (Fig 3)

Specimen consists of an irregular mass, about the size of a fist. On the surface, a firm, friable, yellowish white mass is seen occupying almost the entire aspect of the speci-

men. On section, the lumen of the gut is found raised and irregular. Occupying almost the entire extent of the lumen is an irregular tumour mass, firm and friable, yellowish white in colour with reddish streaks showing numerous papillomatous cauliflower-like projections which are seen infiltrating the entire wall.

Microscopically appearances are those of a very cellular and fairly vascular fibrosarcoma.

### Comment

Regional lymph glands in the Pelvic Meso colon were not enlarged, nor were any distal glands enlarged.

The history of passing blood in the stools is consistent with a sarcoma of the sigmoid which has infiltrated all layers of the gut.

*Pain in the lower abdomen and both hips*—If the Sarcoma is in the Rectum and Sigmoid the pain will be referred to the Supra-pubic and lower abdomen and therefore quite consistent with the clinical examination. The cause of the pain being referred to the hip is not easily explained because there was no infiltration of the tumour in the surrounding pelvic nerves.

*Difficulty in sitting down for passing urine* It is due to pain consequent on increased intra-abdominal pressure.

The transient relief noticed in the hospital was due, perhaps, to rest in bed and symptomatic treatment and partly to the early stage of the disease.

A two or three-stage operation should have been done, the case was not suitable for a Paul-Mickulickz procedure.

Endothelioma of the Sigmoid is described by Lockhart-Mummery and Gabriel describes three cases closely resembling Sarcoma in its clinical features.

Robert Abbe in Keen's Surgery, describes three types of Sarcoma. He says that primary sarcoma is very rarely found in the rectum. Secondary invasion is not infrequent due to metastasis from the original growth in other pelvic organs.

The Primary Sarcomata are of 3 types —

(a) A form frequently found in the small intestine, but rarely in the rectum, is the lympho-sarcoma, which arises in the lymph follicles of the intestinal wall. Usually, however, such growths are not single and confined to the rectum alone, but are multiple and are present also in some other

portion of the intestinal tract. Instead of causing stenosis as do the carcinomata, a lympho-sarcomatous growth in the rectum is apt to cause a dilatation of the viscus and in any case, does not narrow the lumen. The tumour involves the submucosa and muscularis and forms elongated masses lying lengthwise to the gut and is not so apt to produce cylindrical thickenings as carcinoma.

(b) Another form of Sarcoma is spindle or mixed cell-sarcoma arising from the connective tissue of the submucous layers. These tumours may project into the lumen and form pedunculated masses, but usually remain more or less spherical growths.

(c) The third type is melanoma.

Keen describes Endothelioma arising from the endothelium of the dilated vessels present in haemorrhoids. Endothelioma of the rectum closely resembles a sarcoma in its clinical features and three cases of endothelioma are described in Gabriel's Principles and Practice of Rectal Surgery, 1932.

In 1929 Rankin and Chumley reported a series of 18 cases of Lympho-sarcoma of the colon and rectum, the location of the tumour was as follows: 13 were in the caecum, one was in the descending colon, one was in the sigmoid and three in the rectum. In 1933 Smith found 17 recorded instances of lympho-sarcoma of the rectum and the sigmoid and added the cases of 6 patients treated in the Mayo-Clinic since 1926. Raiford in 1933 reviewed a series of 45 cases of lymphoid tumour of the gastro-intestinal tract from the Johns Hopkin's hospital. The distribution was as follows—13 stomach, 1 duodenum, 19 ileum, 11 colon and in 1 the rectum.

These tumours predominantly affect men, Sutton stated that these growths are located in the lower portion of the rectum. The inguinal nodes may be involved. These growths are of two types, the polypoid and the diffuse infiltrative types. The polypoid formations are firmer in constituency than the softer adenomatous polyps. The process extends along the submucosa and at first forms a localised submucous thickening which by pressure may cause necrosis or which may invade the mucosa. Later ulceration and bleeding may follow. In some instances the mucosa may move freely over the tumour mass. The tunica muscularis is invaded and replaced by lymphoid tissue. In many of the reported cases the infiltration does not extend beyond the serosa. There is a report of a case of polypoid mass in the posterior quadrant of the anus 0.5 cm. about the pectinate line in a man aged 27. Such early cases of malignant lymphocytoma have to be differentiated from chronic inflammatory processes and benign lymphoid tumour and rectal tumour of chemical origin due to injections for haemorrhoids.

### Conclusion

In the reported series of cases in the literature, the type of case reported now is rare, the cases described in the Archives of Surgery are in the lower part of the rectum

I am indebted to the Superintendent, General Hospital, for permission to publish the case and to the Pathology department of the Madras Medical College for the drawing and other reports

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# THE SURGICAL TREATMENT OF EPILEPSY

BY

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The treatment of the syndrome called Epilepsy has been quite unsatisfactory from a medical point of view. Apart from controlling the frequency and severity of the fits by drugs and by attention to general environment there is very little that can be done. The only hope for these cases seems to lie in the Physician being able to discover some organic lesion which can be dealt with surgically. Thus, when epileptic fits occur in association with a cerebral tumour, its localisation and surgical removal holds out a good prospect of freedom from fits. The problem here, however, is the major one of the cerebral tumour and epilepsy comes in only as a symptom thereof. It is in epilepsy following trauma to the skull that surgery plays its most important role. In this connection it is perhaps unnecessary to point out that proper treatment of the primary injury will, in many cases, prevent the onset of this peculiar condition of excitability of the cerebral cortex which, once it has become established, is so difficult to handle successfully. As will be apparent from the cases reported below, even the discovery and removal of a gross organic lesion does not prevent the recurrence of the fits and the longer the interval between the first onset of fits and the surgical interference, the less are the chances of complete recovery. The importance, therefore, of knowledge of the pathological conditions associated with post-traumatic epilepsy and adequate early treatment directed to the prevention of their occurrence cannot be over-emphasized. Such pathological conditions are—depressed fragments of bone, adhesions of the cortex to the duramater, organising subdural blood clots and retained foreign bodies. It will be beyond the scope of this paper to go into details regarding the management of cases of "Head Injury" but a few points in the treatment in so far as it relates to the prevention of epilepsy may be mentioned. The early elevation or removal of depressed fragments of bone, the removal of foreign bodies, blood clot and damaged brain in compound fractures, accurate closure of the dura where this is not contra-indicated, absolute haemostasis and strict attention to asepsis are some of the more important things to be kept in mind.

In the treatment of established cases of epilepsy where there has been no history of a "Head Injury," surgical treatment will not be indicated except where signs and symptoms point to a localised organic lesion and then the treatment is no longer that of 'Epilepsy' but is of the lesion that has been demonstrated. Even where there is a history of injury, in the absence of

signs or symptoms of a localising nature, surgery is contra-indicated. It is true that a few cases of idiopathic epilepsy and post-traumatic epilepsy have responded to injection of air into the Theca. It is not, however, a procedure which can be considered entirely free from danger and must be used with caution. As a diagnostic procedure to indicate the site of adhesions it is of great value but should only be used when operation has been decided upon.

Compound fractures of the skull contribute the largest number of cases and defects in the skull have loomed large in the minds of Surgeons as witness the number and variety of ingenious methods described to deal with such defects. Actually, defects, in themselves, are not the cause of epilepsy and free removal of bone is to be preferred to attempts to retain fragments which are difficult to retain in position with the idea of reducing the size of the cranial defect. Cortical adhesions and scars are of greater importance as causative factors.

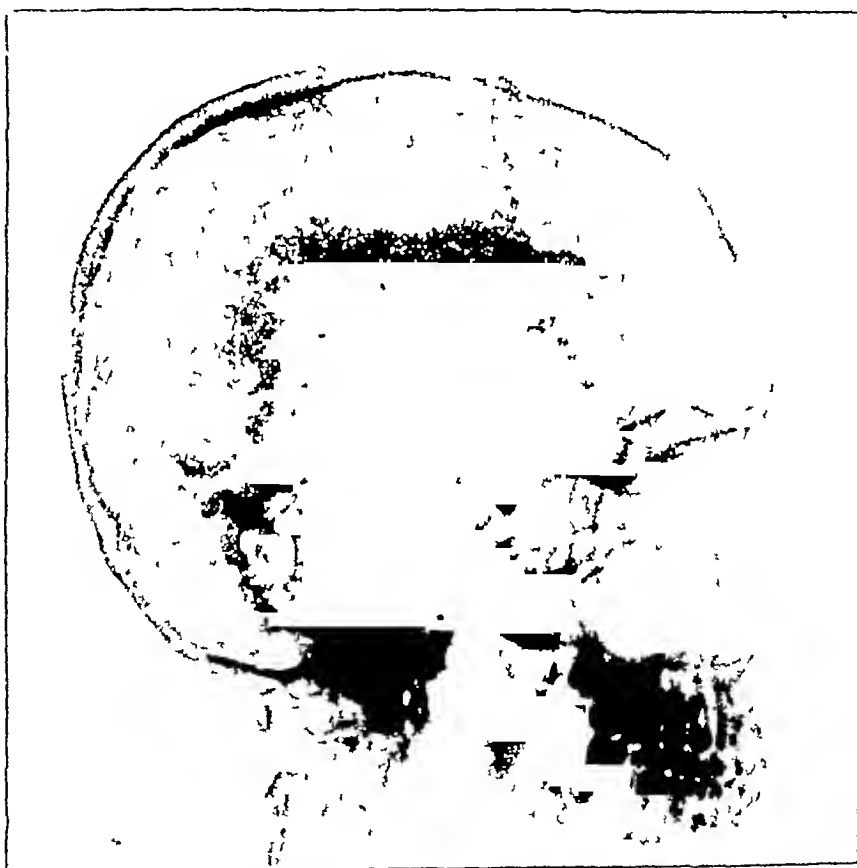


Fig 4 Case I Skiagram taken before operation showing the calcified mass in the right fronto-parietal region

In the cases reported below, case 1 had a gross, easily demonstrable lesion, diagnosis presented no difficulty and treatment was successfully carried out, the result, however, was anything but satisfactory, contrary

to all expectations Case 2 had very little organic lesion to show, there was some relief after operation but the final result cannot be assessed as the patient has been lost sight of Case 3 showed increased vascularity and oedema of the cortex, nothing was done for this, there was some relief of symptoms but the final result has not been satisfactory Case 4, not belonging to the traumatic group, but due to an inflammatory lesion has also, as far as is known, not been cured of his fits



Fig 5 Case I Sktagram showing the calcified mass removed and the osteo-plastic flap  
This flap was placed too far backwards and bone had to be nibbled away in front

## Case Reports

### CASE 1

Male aged 16, student Admitted for fits and headache

*History*—Parents healthy, no fits in the family on either side Attack of Typhoid 8 years ago Soon after that had a fall from a height of about 5 feet He fell on the right side and hurt his head, there was no open wound No details are available regarding consciousness, etc, but he was apparently all right

The onset of fits occurred a year after the injury the first fit having been noticed 7 years ago Preceded by a sensation of itching of the whole of the left side, the fits

started with twitching of the face, spreading to the upper and then the lower, extremities. Consciousness was sometimes lost but not invariably. Sphincter control was never lost and the fits have always been confined to the left side.

*On Admission*—Well nourished and otherwise healthy. Complaints of headache on and off not localised to any part of the head. Has never vomited and vision has been normal. Intelligence and activity, normal. B.P. 100/60. Pulse 80. Resp. 24.

*Local Condition*.—Examination of the skull reveals no scars, areas of tenderness or other objective signs. Cerebration—Good. Speech—Not affected. Cranial Nerves—Not affected.

*Spinal Motor Nerves*—There is hemiplegia of the upper motor neuron type of the whole of the left side except the face with a tendency to flexion contracture of the upper extremity, increased tendon reflexes, and extensor plantar response. The gait is spastic on the left side.

*Visual reflexes*—Not affected. Ophthalmoscopic examination showed a normal fundus with no defects in the visual fields and no evidence of increased intracranial tension.

*Skilagram*—(Fig 4) showed the dense irregular shadow of a calcified mass in the left fronto-parietal region, which on stereoscopic examination was seen to be rather deeply situated.

*Operation*—Under local anaesthesia (1 in 1000 pantocaine) supplemented by C2E3 at the start, a large fronto-temporal osteo-plastic flap was turned down. The durameter had a peculiar spongy reticulated appearance. It was opened by crucial incision. In the anterior part of the field exposed there appeared to be a cyst. This was opened into and a fair quantity of clear fluid escaped. On exploration with a finger an irregular hard lump was felt lying in the lower anterior angle of the wound, somewhere in the region of the inferior part of the fissure of Rolando. It was loosely attached and was lifted out and removed without difficulty. Most of the cyst wall was also dissected out. There was no bleeding. The dura was replaced and sutured carefully with interrupted silk and the osteo-plastic flap was sewn back.

*Post-operative progress*—Had a fit soon after the operation and was in a state of moderate shock. Intravenous glucose saline by the open method brought him round, but for the next week he continued to run a temperature ranging up to 102 and the pulse rate remained between 120 and 130. No signs of meningeal infection were, however, noted. During this period he had repeated injections of hypertonic glucose. By about the 10th day after operation when sutures were removed, the temperature had settled down and the pulse had come down to normal. Thereafter, except for occasional mild fits and sometimes the aura without any fits, he ran an uneventful course and was discharged about 10 weeks after admission with instructions to continue taking Luminal for a period of two years. This instruction he followed very irregularly and in the subsequent progress fits occurred though with less severity and at very much longer intervals. There was no improvement in the hemiplegia.

*Pathological report*.—The soft tissue (the Cyst wall) shows oedematous glial tissue and chronic inflammatory loose fibrous tissue. The calcified nodule shows an irregular, thick, hyaline capsule and a homogenous calcifying centre. Ossification is seen in some parts of the periphery next to the capsule. The condition appears to be an old area of cerebral softening undergoing encapsulation and calcification.

The original injury must have caused localised contusion of the brain the area affected later undergoing the changes noted on pathological examination. It is surprising that there were no marked symptoms of cerebral damage noted at the time

The latest report from the patient, received about three months ago is very disappointing. Even though the number and severity of the fits have been considerably reduced, they still occur and this has been the cause of considerable disappointment to the parents. Further, he has been losing weight and the local doctor suspects Tuberculosis of the lungs which is rather an unfortunate addition to his troubles

## CASE 2

Male aged 46 was admitted in April 1938 for fits and discharge from both ears 8 years ago he knocked his head (right side) against a wooden beam and a local swelling appeared which subsided after some time. About this time he also noticed a discharge from both ears, probably quite unconnected with the injury. This discharge has continued on and off till the time of admission. About a year ago, he had another injury on the right shoulder and neck, again by a wooden beam. A month later he began to get fits. The fits started with twitchings on the left side of the face, then the left limbs and then the whole of the body, each fit lasting 2 minutes. There has been loss of consciousness occasionally. Sometimes the fits are milder and stop with the face. They occur more frequently in cold weather.

General condition—Good. Circulatory and Respiratory systems—Normal

Examination of the Nervous system did not reveal any abnormality or any localising sign.

Examination of the ears showed bilateral Otitis Media with perforation. There was no tenderness in the mastoid regions or any other indication of extension of inflammation from the ears.

X-Ray examination of the skull showed an area of localised sclerosis of bone in the right parietal region, the site of the original injury but nil else abnormal.

On the idea that underneath the area of sclerosis, coinciding as it did with the site of the injury, there might be some pathological condition which could be dealt with surgically, operation was decided upon. An osteo-plastic flap was turned down under local anaesthesia supplemented by Gas, Oxygen and Ether. The inner surface of the bone was quite smooth. A localised thickening of the dura was felt in an area corresponding to the sclerosis seen in the skull. This thickened patch was excised. No adhesion or other abnormality was seen in the underlying brain. The flap was stitched back. Convalescence was uneventful except that he had a few fits but not so frequently as before. He was discharged five weeks after the operation.

A few days after discharge he wrote and said that the fits were as frequent as before. He was advised to take Luminal which, for some reason, was not given at the time of discharge. There has been no further communication from him and the subsequent progress is unknown.

In this case, the long interval between the injury and the onset of fits seems to indicate the absence of any connection between the two. The only feature which prompted exploration was the slight bony change seen at the site of the injury. The duration of the fits being comparatively short, the absence of any relief after operation and the absence of any pathological lesion in the cortex seems to suggest that here the epilepsy had nothing to do with the injury.

## CASE 3

Boy aged 14, student Admitted in May 1937 for fits of six months' duration

*History*—Some two years back he fell down from the first floor of a house, about 14 ft, and was unconscious for about 8 to 10 hours No definite injury was noticed and no special treatment was carried out

The present trouble began 6 months ago He makes a noise, falls down and gets convulsions all over the body and limbs This lasts for a minute or two, then he breathes heavily for 2 to 10 minutes, the limbs become flaccid, and consciousness returns after another 10 or 15 minutes These fits occur off and on without any known exciting cause and at intervals of 5 days or oftener

General condition—Good Circulatory and Respiratory systems normal

Examination of the nervous system did not show any abnormality except exaggerated knee jerks and ankle clonus on the left side but the plantar response was not extensor The right side of the head appeared to be slightly more prominent than the left Other investigations did not reveal any abnormality

*Operation*—Under local infiltration anaesthesia, Incision was made for a fronto-parietal osteo-plastic flap and the bone division was completed when the patient's condition caused some anxiety, further operation was postponed, and the wound was closed

Three days later he had two fits closely following each other Five days after the first operation the wound was re-opened, the osteo-plastic flap was completed There was a considerable amount of bleeding from the outer surface of the dura which was controlled by endothermy The dura was opened after controlling the Middle Meningeal vessels The cortex underneath was seen to be unduly vascular and showed dilated veins The Arachnoid was opaque in places and there appeared to be some oedema of the cortex exposed especially towards the middle line There was some bleeding from the Superior Longitudinal Sinus and this was controlled by sutures The patient's condition again causing anxiety, further exploration was given up and the flap was sutured back. Beyond a little leakage of cerebro-spinal fluid from one spot in the wound, convalescence was uneventful and the patient was discharged a month after the operation.

He remained free from fits for some time after the operation, about two years, but they have since recurred and are as bad as they were before

## CASE 4

Male aged 24 admitted for a discharging sinus left side of the forehead and fits

*History*—His troubles started six years ago, with a swelling in the region of the left eyebrow, with high fever and headache He was operated on for what is presumed to have been Frontal Sinus Suppuration. The wound took a long time to heal, about six months He was free from trouble after that till about a year and a half ago when he first noticed fits They have become frequent of late Details regarding the nature of the fits are not available

On examination, his general health was good. The scar of the operation was seen over the left eyebrow with a small sinus discharging pus

*Skullgram* showed a cranial defect in the region of the frontal sinus with the outlines blurred in one place and appearances suggestive of a sequestrum with a collection of pus around.

*Operation*—Under General anaesthesia a flap was turned down over the forehead and the periosteum was lifted from the cranial defect. The sinus was seen to lead to thickened duramater. This was incised in the inner angle of the wound and a small extra dural collection of pus was seen and, after free removal of bone over it, was laid open.

Following the operation he had two fits the same day and was put on Luminal. The wound healed satisfactorily after a fortnight and there were no more fits for some time afterwards. The information available so far, however, seems to indicate that as regards the fits, the operation has not done much good.

### Comment

A study of these four cases confirms one in the belief that operative treatment in cases of Epilepsy is likely to end in many disappointments. Even in the two cases (1 and 4) where definite and gross organic lesions were successfully dealt with the result has been anything but satisfactory. Perhaps with a more extended use of the electro-encephalograph and better selection of cases the results might be better. We have however, not yet equipped ourselves in Madras with this very necessary addition to the neurologist's armamentarium.

My thanks are due to all those colleagues of mine who have helped me with the notes of these cases, to the Late Dr P Ramachandra Rao for the pathological report on the material removed from case 1 and to Lt-Col. K G Pandalar for permission to use his cases (3 and 4).

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# ARTERIO-VENOUS ANEURYSM—REPORT OF A CASE

BY

C M JOSEPH, B A , M B , & B S

Any abnormal communication between an artery and a vein is known as an arterio-venous aneurysm. The first case was reported by Hunter as early as the middle of the 18th century. Later on though it came into prominence as a complication of venesection in the last century, it has become very interesting in the field of surgery only during the Great War, or more correctly, the last war.

Though cases of this type are not new to our hospital, I venture to report the present one, because it presented some interesting features, such as the situation, the rapidity of its progress and the method the surgeon was forced to adopt due to lack of proper material and the complication resulting therefrom.

## Case Report

A Patient by name Ethirajan, Hindu, aged 26 was admitted into Noblock ward under Dr C. P. V. Menon, on 27th March 1942, for a pulsating tumour in the right side of the neck of 20 days' duration. There is nothing very interesting in his family history. He had an attack of small-pox 20 years ago.

The history of the present complaint is that 25 days prior to admission while filling a soda water bottle, it burst suddenly and a glass piece struck him in the region of the right anterior triangle of the neck. There was profuse bleeding from the wound and the patient lost consciousness. He was immediately taken to the local dispensary where the medical attendant stopped the bleeding and sutured the external wound. A few days later the patient noticed a progressively enlarging swelling at the site of injury which started pulsating and he came to the General Hospital for treatment and advice.

On admission the general condition of the patient was quite satisfactory. There was slight dilatation of his right pupil but it was reacting to light.

Locally a pulsatile lump in the anterior triangle on the right side of the neck above the level of the thyroid cartilage was visible. The skin over it was stretched and shining (Figs 1 and 2). The pulsation was expansile in nature and synchronous with the heart beat. There was continuous thrill over the swelling with a systolic intensification which had a definite purring quality. The murmur over it was also continuous with systolic intensifica-

tion and was of the nature of the "buzzing of a blue bottle imprisoned in a paper bag" The thrill and murmur were conducted along the vessels for some distance Posterior to this swelling another lump was palpable which also exhibited expansile pulsation

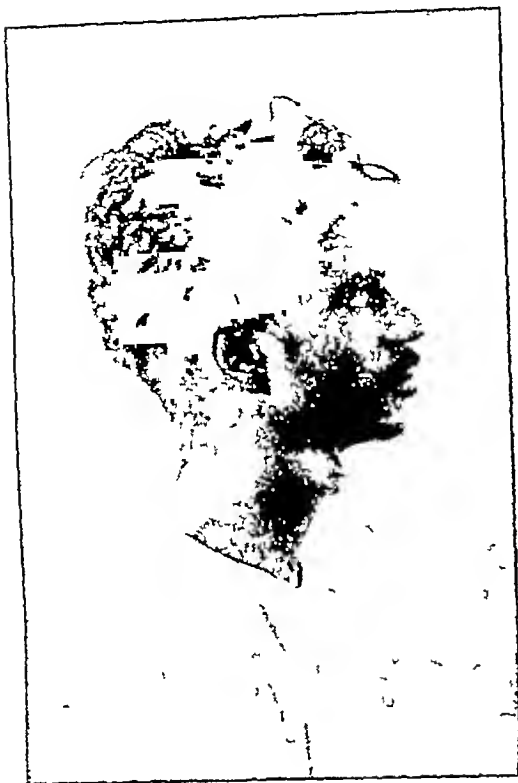


Fig 6 Arterio-venous Aneurysm

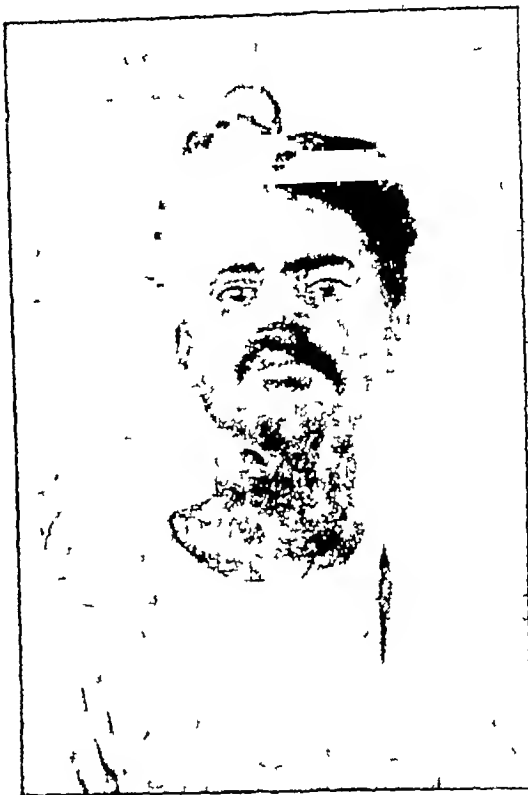


Fig 7 Arterio-venous Aneurysm

The condition was provisionally diagnosed as an arterio-venous aneurysm of the common carotid artery and internal jugular vein

Immediately after admission the patient was put to bed under strict orders not to get up and move about for fear of rupture of the aneurysm and the progress of the swelling was watched daily

29-3-1942 The skin over the aneurysm appeared unusually thin and stretched out The possibility of an early rupture was feared and immediate operation was decided upon Under general anaesthesia a long incision was made over the anterior border of the right sterno-mastoid The carotid sheath was exposed The common carotid artery was isolated below the aneurysm and controlled by a Crile's clamp The internal jugular vein was found to be dilated, tense and pulsating Its wall was very thin and despite extreme care on the part of the surgeon to prevent a rupture, its wall gave way, while trying to free it from its sheath It was divided between

ligatures above and below the communication with the artery. The lack of the proper suture material stood in the way of the surgeon attempting a restorative operation and he was forced to adopt the next best procedure under the circumstances, that of excising the aneurysm. The common carotid artery was divided between ligatures and by making another incision transverse to the first, and leaving an ellipse of skin over the prominent swelling the whole aneurysm, was dissected out tackling a number of small vessels that came in the way. In addition to the forward extension the aneurysm had extended backwards between the vessels to the prevertebral muscles and into the posterior triangle. The cervical sympathetic though adherent to it was intact. But the vagus which must have been divided by the original injury was adherent to the sac in a mass of scar tissue. This was freed and the whole mass removed after ligaturing the carotids, above. The ends of the vagus were brought together by silk after refreshing the edges. The wound was closed with a small drain after instilling about six grams of proseptasine powder into the wound. The whole procedure took about three hours.

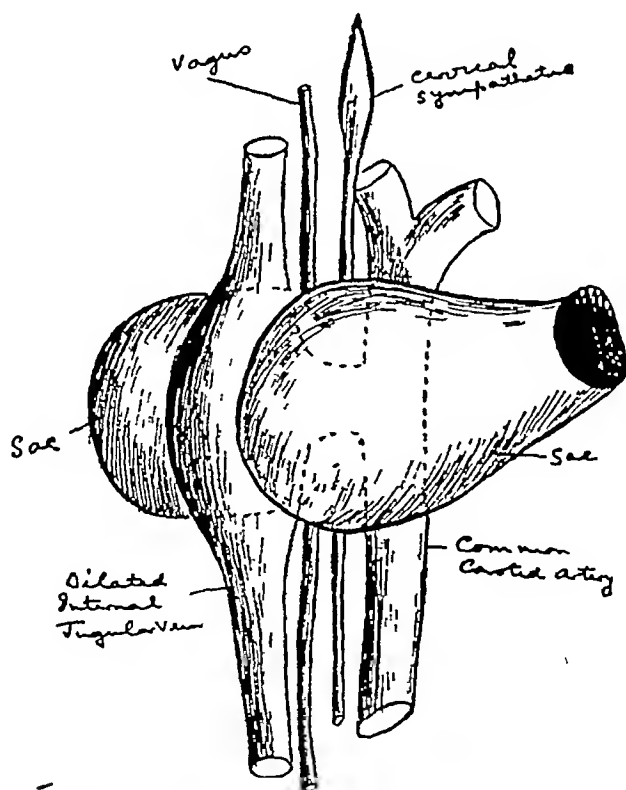


Fig 6 Diagrammatic sketch of the Specimen removed at operation

The specimen consists of a somewhat irregular sac, connecting the common carotid artery, and the internal jugular vein. The sac starting between the artery and the vein has enlarged in two directions, (1) For-

wards and to the medial side, and had become adherent to the skin just to the right of the middle line (see Fig 8) (2) The second extension was behind the vein into the posterior triangle of the neck At the time of the operation the sac contained mainly liquid blood with some clot The sac was surrounded by fibrous tissue except anteriorly where it was formed by the skin In addition, the specimen contains about 3 cm of the common carotid artery and an equal length of the vein along with a piece of skin The wall of the vein is thinned out and communicates with the sac through an opening about 2 mm in diameter The communication with the artery and the sac was small

Even before removing the patient from the operation table, hemiplegia of the left side was noticed The patient was put on 6th hourly morphia 1/6 grain during the 1st 24 hours and later 1/6 grain daily for another four days 50 c c of glucose also was given I V twice daily We had an anxious time during the first 24 hours and hourly pulse and respiration were recorded But the next 24 hours showed a definite improvement in his condition and we were relieved of our anxiety

1-4-1942 Drainage tube removed

8-4-1942 Sutures removed.

The condition of hemiplegia gradually improved Speech was gradually recovered and the patient was able to walk though with a drag of his left leg He was however unable to use his left arm He was discharged on April 14th during the Mass Evacuation of patients from the hospital Fifteen days later the patient was readmitted for the residual paralysis of the left side, giddiness and hoarseness of voice There was slight wasting of the left upper extremity due to disuse atrophy Physiotherapy was started and then he was discharged with instructions to continue the same as an out-patient

### Comment

If one were to comment on the operative procedure adopted, the ideal would have been excision of the sac and repair of the lateral openings in the artery and the vein by suture, or excision of the vein with repair of the arterial defect The lack of suitable material for arterial suture, however, left excision as the best available procedure The onset of hemiplegia, though feared, was not considered likely on account of the age of the patient

Arterio-venous aneurysms are mostly traumatic in origin, though congenital and spontaneous types have occasionally been reported Two types are known.

(1) The aneurysmal varix where there is a fistulous opening between two adjacent vessels and (2) the varicose aneurysm, as in the present case,

where a haematoma enclosed within a fibrous wall develops between an artery and a vein communicating with both

The commonest sites for traumatic arterio-venous aneurysms are those where the artery and vein are enclosed in the same sheath, as in the femoral region. As it progresses it brings about changes in both the vessels that take part in it, in the sac, and in the general circulation depending on the length of time

The vein dilates above and below and even becomes tortuous due to the unaccustomed arterial pressure. Distal to the aneurysm the pressure falls in the artery and it contracts but proximally it dilates

The communicating sac only thickens by increased fibrous condensation, but never enlarges and the increasing size of the tumour is due to the progressive dilatation and tortuosity of the vein. Nutrition of the part distal to the aneurysm suffers due to arterial deficiency. The aneurysm increases the strain on the heart and hypertrophy and later dilatation follows, unless the aneurysm is removed, when the heart comes back to its original condition

Generally a considerable interval occurs between the injury and the discovery of the aneurysm. In the present case the interval was very short and its rapid increase in size almost to the point of rupture is noteworthy

My thanks are due to the Superintendent, Government General Hospital, Madras and to Dr C P V Menon for permission to report this case

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# OSTEOMALACIA—REPORT OF A CASE

BY

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AND

S BALAKRISHNAN, M B , B S ,

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The rarity of this disease in South India is sufficient reason to justify the report of the following case

A Hindu woman of 25 years who was under the observation of the senior author for some time, was later admitted into the General Hospital on the 5th of November, 1942, for investigation. Her complaint was pain in the upper part of thighs while she was walking—the duration being 6 years. The following is the history of her illness which is very suggestive of the disease. Before she was 25 years of age she had had 5 deliveries. The 1st pregnancy proceeded to full term and she was delivered of a dead child without any obstetric intervention. The 2nd was a forceps delivery and a dead child was delivered. Soon afterwards, she noticed pain in the upper part of her thighs, which was then believed by the doctors to be due to the application of forceps. The 3rd delivery, from the way she described it, seems to have been a case of transverse presentation. Again a dead child was delivered. The 4th child must have been born premature. She said that she was delivered normally of a child which lived up to its first year. This sounds incredible but one can pass it over as being due to her lack of education. She conceived a fifth time and this time she submitted herself to a Caesarean section, at her full term. This last-born child is reported to be alive and healthy and he is now 5 years old.

The longstanding complaint had been steadily becoming worse—the pain in the thighs and the difficulty in walking. She did not give any familial or hereditary history of a similar trouble in any other member.

From the way she walked, one could not have suspected that she had fracture of both femora. One would have suspected rather a congenital double dislocation of the hip. She had a typical waddling gait. One could see the side-to-side rocking motion of her pelvis as she walked. When the fractures were later seen in the X-ray pictures, the fact that she was able to walk at all appeared to be a matter of interest.

The following were the investigations done —The X-ray picture of the pelvis was taken first (vide Fig 9) A clear transverse linear cleavage was seen in both the femora in the upper third, of an appreciable thickness laterally, but not quite distinct towards the medial borders of the bones. Possibly the fractures had united but were not calcified well-enough to merge into the general bone shadow. The symphysis pubis was separated by a wide central gap where the posteriorly-situated sacrum and coccyx were fully visible. Osteoporosis was noted in the iliac bones and in the femora. Then skiagrams of her entire skeletal system were taken to see if one could discover any other pathological fractures or any other abnormalities in the bones. In one more situation, the upper third of the left ulna—there was seen a similar lesion, namely a jagged fracture extending right through the



Fig 9 Showing the deformity in the pelvis and the bilateral symmetrical fractures of the Femora

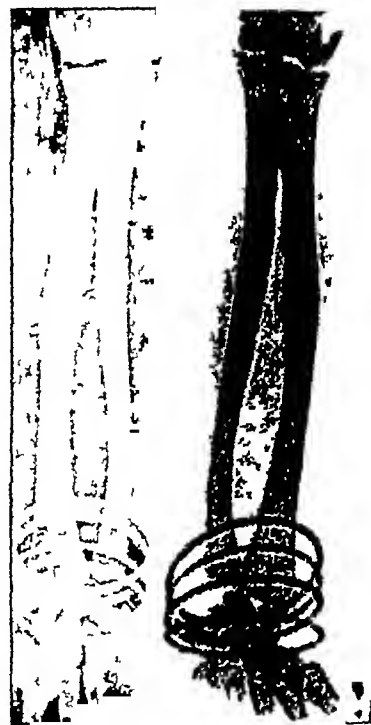


Fig 10 Showing the fracture of the ulna

bone (vide Fig 10). The rest of the skeletal system, except for Osteoporosis, was found to be normal. The skull bones were normal. No tumour-like masses were found in the bones. An X-ray of the neck did not reveal any calcified spot in the region of the parathyroid glands.

The serum calcium was 8.95 mgms per 100 c.c. which is about the normal level in our Indian patients (K. N. Murthi, 1931). The blood phosphorus was 2.235 mgms per 10 c.c. so that the product calcium phos-

phorus (Ca x P) was only 20 003 which is only half the normal figure—a phenomenon which, it will be remembered, is seen also in rickets where the blood phosphorus is less than 3 mgms per 100 c c whenever there is no marked reduction in the serum calcium

The absolute count of the R B C was 3 8 million per cubic mm Haemoglobin was 72% The blood picture was only suggestive of a very moderate hyperchromic microcytic anaemia The fragility of the cells was normal Her W B C were 6500 per cubic mm Her blood pressure was also normal, the systolic being 110 mms of mercury and the distolic was 68 mms (These pressures seem to be within the normal limits for South Indian women of moderate height and build) Her blood Wassermann was found to be negative which is a very important negative finding The 24 hours' urinary excretion of calcium was 45 63 mgms per 925 c c of urine But the complete calcium balance could not be done as she insisted on going home shortly after her admission

The clinical picture was so complete that the diagnosis was at once evident Pathological fractures are met with in cases of fibro-systic disease, rickets, malignant diseases of bone, Osteitis Deformans (Paget's Disease), Multiple Myeloma, Fragilitas Ossium, and Osteogenesis Imperfecta From the progressive disorder of the bony system due to decalcification and weakening of the skeleton associated with spontaneous fractures and distortion of the bones, the age of the individual, the poverty, the suggestive history of the deliveries she had, the stature, the pelvic deformity and the suggestive bio-chemical evidences we conclusively proved this to be a case of Osteomalacia The clinical evidence of wandering pains in the limbs worse at night was also suggestive of the same disorder

We have pleasure in thanking the Superintendent of the Govt General Hospital for permission to report the case and the Barnard Institute of Radiology, for the X-ray photographs

#### REFERENCE

MURTHI, K. N, *Clinical and Scientific proceedings, B.M.J*, 17 Oct 1931, pp 702-3

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**ANNUAL MEETING** It has been decided, after consultation with the members of the Governing Body, to postpone the Annual Meeting which was proposed to be held at Hyderabad in February, 1943. The date of the next meeting will be decided later.

\* \* \* \* \*

## SUBJECTS FOR DISCUSSION

### 5th Meeting

- 1 Laryngeal Carcinoma by Dr H. D. Gandhi and Dr S. G. Joshi, Bombay
- 2 Injuries of the Thorax by Dr C. S. Patel, Bombay
- 3 Surgery of the Gall Bladder by Dr P. Chatterjee, Calcutta

### 6th Meeting

- 1 Traumatic Surgery of the Skull by Dr R. N. Cooper, Bombay
- 2 Carcinoma of the Breast by Dr N. C. Joshi, Delhi.
- 3 Urinary Lithiasis by Dr L. B. Joshi, Karachi

### 7th Meeting

- 1 Carcinoma of the Rectum by Dr C. P. V. Menon, Madras
- 2 Enlarged Prostate by Dr S. R. Moolgavkar, Bombay
- 3 Fractures of the neck of the Femur by Dr B. N. Sinha, Lucknow

### 8th Meeting

- 1 Carcinoma of the Cheek by Dr B. M. Joly, Delhi
- 2 Tuberculous disease of the Spine by Dr S. P. Srivastava, Agra.
- 3 Hare Lip and Cleft Palate by Dr S. C. Sinha, Calcutta

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# CANCER OF THE MOUTH AND JAWS

BY

T H SOMERVELL, M B, F R C S—NEYYOOR

During the last twenty years the staff of the London Mission Hospital at Neyyoor has performed over ten thousand operations for carcinoma, and of these four out of every five—that is to say some eight thousand, have been done for epithelioma of the mouth, including cheek, lips, tongue, and jaws.

In this 20-year period, the number of operations performed for malignant disease at Neyyoor is 10,480. Of these 10,125 were done for carcinoma, the remainder (355) being for sarcoma, malignant endotheliomata, teratomata, thyroid tumours, and other malignant conditions the classification of which may roughly be put under the general heading of "sarcoma, etc."

It is a remarkable thing that in this extreme Southern end of India, the incidence of carcinoma of the mouth is so very high. Out of 10,125 operations performed for carcinoma, no less than 7,445 were done for epithelioma of the mouth, including lips, tongue, cheek, upper and lower jaws.

The explanation of this was studied for some years by my colleague I M Orr and myself, and Orr made a survey of a large number of cases, with especial regard to etiological factors in the chewing of betel-leaf, areca nut, lime, and various kinds of tobaccos.

This investigation was published in the *Lancet* of 1936, and it is not my intention to go over this ground again, except to say that we were satisfied that the following are the main etiological factors causing epithelioma of the mouth in South India.

(1) Chemical irritation due to the alkaloids produced by the action of lime on the tobacco chewed with the betel leaf and areca nut. The more prolonged this irritation, the more likely is it to lead to epithelioma. Thus

(2) Poor people who keep their quid of betel in the mouth for a long time (sometimes all night) are more prone to cancer of the mouth than are those who can afford to change the betel-nut at frequent intervals.

(3) The use of lime made from shells is more injurious than is lime made from limestone, owing to its fine division and rapid setting free of the alkaloids from the tobacco. Hence the high incidence of cancer of the mouth in the districts near the sea-coast where shell-lime is used.

(4) Certain kinds of tobacco, notably the strong Vadakkan tobacco of S India, and the tobacco of Jaffna, Ceylon, are more prone to cause cancer of the mouth than are the milder tobaccos.

(5) The Betel leaf and areca nut are in themselves harmless in this respect. So is the tobacco unless mixed with lime. Orr sums up his results in the following paragraph, taken from our annual report in 1936:—

“Cancer of the mouth is still and probably always will be our really characteristic indigenous disease in Travancore. If the Government were to put an embargo, or a very high duty, on certain kinds—two only—of tobacco, we believe they could cut out with a stroke of the pen some 70% of the cancer in this country. But as the research which has resulted in this finding was performed in a Mission and not a Government institution, it is unlikely that it will be accepted as authoritative. Be that as it may, the fact remains that over 500 of our operations each year are for the relief of cancer of the mouth, tongue, jaw and cheek. And 90% of the disease arises from chewing two kinds of tobacco with the betel-nut. The other four or five kinds which are used locally seem to have little or no deleterious effect.”

The aim of this paper is different from that of Orr's work, being therapeutic rather than etiological. In the course of 20 years of dealing with these large numbers of cases of cancer, we have found out a good many points in regard to the treatment, whether by radium, operation, diathermy, etc., and have likewise found many of the limitations of the various methods of treatment, and certain principles the adoption of which leads to a good prognosis in many cases of epithelioma of the mouth. I shall also describe some points in regard to the technique of operations, and the nursing and after-care of the patients, besides indicating plastic methods which we have found useful in repairing the gaps in the face which are so often unavoidable as a by-product of the radical treatment of carcinoma in and around the oral cavity.

The work of a hospital in a country district in India suffers from one great drawback, of special importance in dealing with malignant disease. It is almost impossible to follow cases up as we should like to do. Many recurrences go straight to other doctors or hospitals, and we never hear of them again. Many go to quacks and rapidly die under their hands—and we know nothing of their fate. On the other hand, we are constantly seeing the failures of other surgeons and clinics, and a great many of the recurrences we see are from other hospitals. Anything in the nature of complete statistics of our cases is therefore out of the question. We do, however, keep in touch with a certain number of our cases, and we see them often, years afterwards, when they come bringing some other patient for our treatment.

After all these years, one can at least feel that one has a fairly good idea as to what is the rate of recurrence of each class of case, and one learns in a general way, not by keeping records of figures, what is the relative value of Radium, operation, X-rays, and their combination, in dealing with these cases. This paper, then, will not be burdened with figures—for such figures

as one has collected in the country districts of India are valueless. But of more real value, I maintain, than any set of figures are the general impressions one has obtained in the course of twenty years, and the improvements in technique of operative methods which we have found out and evolved in the course of dealing with so many cases of cancer of the mouth. Experience rather than statistics, then, must be the foundation of these remarks.

Sir E. Mellanby, in his "Recent advances in Medical Science" (1939, pp. 46-49) writes as follows:

"The present methods of treating cancer, except in certain cases, are not good enough to lead to the expectation of great saving of life even when more extensively used. The whole future of this disease depends upon increased knowledge, and improved methods of combating it, which such knowledge will ensure. Even the best of the present methods of treatment by Radium and X-Rays could be greatly improved by research. Both of these methods of radiation are powerful instruments for harm if not properly used, and it will require a great effort to see that the optimum conditions are adopted in the treatment centres."

He might have added that the combination of operation with radiation offers, perhaps, more hope than the employment of radiation alone can ever give as far as present knowledge goes. It is these considerations, inspired by a feeling that with out large experience of this type of cancer we have been able to improve operative methods as well as to see very clearly both the limitations and the beneficial effects of radiation, that have prompted the writing of this paper, in the hope that its findings may contribute in some small measure to the better treatment of this dread disease. Medical men are too apt to trust blindly in what to them is unknown, and "Deep X-Ray" is as dangerous an idol for the cancer clinician to worship as is "Sulphonamide" for the general practitioner.

The cases of carcinoma of the mouth which present themselves to us at an early stage are nearly all in the cheek. That is where most of the growths begin, and a table of 100 early growths shews that 70% are in the cheek, 15% in the tongue, and 15% on the gums or palate.

The habit of chewing betel-nut and tucking the quid into the cheek should, we might suppose, affect the cheek and the gums in almost equal proportion. But such is not the case, the gums seem to be more resistant to cancer-producing irritation, so that the greater proportion of our cases begin to show malignancy on the cheek. From the cheek the growth, if neglected (or treated by quack "physicians" as is the case with most of our patients), spreads in a few weeks to one or both jaws. From the tongue such spread is far more rare, the growth being confined to the tongue itself until a very late stage is reached.

### Note regarding the use of Radium

In case any of my readers are not familiar with the use of radium in malignant disease, we must insert first, a note about the use of radium. Radium produces Alpha, Beta and Gamma rays. The Alpha and Beta rays are harmful to tissues and not specially destructive of malignant cells, so they are screened off by enclosing the radium in platinum needles or containers at least 0.6 mm thick. Thus the Gamma rays of therapeutic value alone are used. The Gamma ray of Radium has the property of destroying malignant cells in a shorter time than it takes to destroy normal tissue under the same conditions.

A soft growth such as sarcoma or rapidly-growing soft epithelioma is destroyed in approximately half the time (or with half the dose of radium) as is normal tissue. Fascia, skin, and bone are destroyed more easily than muscle. The action of radium varies as the inverse square of the distance between the Radium and the tissue to be destroyed.

With regard to Radium treatment, there are four ways of applying radium to malignant growths —

(1) Mass radiation with a so-called "Bomb" containing a gram or more of Radium, at a considerable distance from the growth. The effect of this is approximately equal on both skin and deeper parts of growth.

(2) Surface application of radium in needles or containers properly screened. Has the disadvantage of intensity of action on the skin, and of wasting over half the available rays.

(3) The insertion of Radium in needles of platinum. The whole of the available rays are used, but the actual insertion of the needles brings with it some danger of spreading the cancer cells into non-involved tissues. To some extent this can be avoided by inserting the needles as far as possible just outside the macroscopic edge of the growth, or if the growth must be penetrated, being careful not to stick the point of the needles, after passing through growth, into normal tissue. This method is the most economical and most generally applicable, and does not tend to kill the skin. In a hospital with many cases to treat and a limited supply of Radium it makes the most economical use of the radium, and if used with the above precautions is the method of choice. It is this method which I employ in at least nine out of ten cases.

(4) The insertion into the tissues of "seeds" of metal containing radium "emanation". This requires a complicated apparatus, and is suitable for large clinics where there is plenty of radium available, it is the only practicable way of treating certain growths, most of these, however, are better treated by operation, the oesophagus being one of the few exceptions.

## OPERATIONS FOR MALIGNANT DISEASE AT NEYYOOR, 1923-42

	1923	1924	1925	1916	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	Total
Carcinoma —																					
1 Mouth U Jaw	4	7	5	18	11	8	5	17	27	24	21	18	20	16	25	34	18	28	22	21	349
2 " L. Jaw	11	17	21	34	27	28	27	52	79	101	84	85	71	66	119	97	96	122	102	99	1338
3 " Cheek	46	49	41	35	44	34	35	77	139	153	134	142	123	142	194	148	187	150	139	168	2177
4 " Tongue	7	15	12	8	7	6	6	22	28	25	23	42	62	37	56	76	63	50	42	46	633
5 Diathermy of Cheek			..		8	7	2	9	24	2	20	21	11	45	40	24	32	26	27	51	356
6 Glands	46	33	42	52	85	76	42	79	119	169	157	170	151	133	165	228	239	225	185	194	2590
7 Breast	1	1	4	2	5	2	2	4	8	5	5	6	7	3	15	8	9	11	9	6	113
8 Penis	7	3	4	2	3	4	5	6	5	12	5	9	15	14	16	11	15	18	8	9	171
9 Rectum		1	.	...	1	.		3	5	1	2		4	3	4	4	6	4	1	9	48
10 Cervix	5	5	8	7	7	5	15	15	36	31	17	32	42	60	41	49	53	52	43	36	558
11 Skin	5	4	8	6	7	8	2	8	2	11	20	15	9	32	30	37	33	14	34	34	316
12 Larynx & P			2						4	1	3	2	1	5	11	13	4	2	10	4	62
13 Other	8	10	10	11	13	13	21	11	17	7	11	12	19	11	3	12	19	20	27	22	277
14 Abdominal Stomach		...	1	3	6	4	2	2	5	42	4	2	3	3	2	2	7	6	12	10	87
15 Ovary	...	.	..	.	.				2		1		3	1	5	3	2		3	3	23
16 Intestine	...	.		.	..	1	1	2		2	1		2	1		1	2	1			14
17 Total opns Primary for Carcinoma	141	145	158	180	224	195	164	307	500	563	518	556	543	572	726	747	785	729	664	712	9129
18 Secondary for Carcinoma	8	10	18	12	43	31	22	22	49	33	32	57	46	50	74	95	66	72	134	122	996
19 Sarcoma etc,	1	3	5	6	14	12	9	11	14	17	27	36	19	17	20	33	23	27	30	31	355
20 Total opns for M D of Mouth	114	121	121	147	182	158	117	256	416	481	439	478	437	439	599	607	635	601	518	579	7445
21 T pts with M D of Mouth	68	88	79	95	97	82	75	177	297	312	282	308	286	306	434	379	396	376	332	384	4853

F H SOMERVELL—CANCER OF THE MOUTH AND JAWS

Of the total cases actually treated in Neyyoor Hospital, nearly 50% are in the cheek, as an analysis of the last 1000 of our cases shows —

Cheek and Lips	498	(not involving either jaw)
Lower jaw	286	(usually involving cheek also)
Tongue	126	
Upper jaw	67	
Both jaws	23	
	<hr/> 1000 <hr/>	

The treatment of these cases will first be considered

1 *Cheek and Lips*—In general, it may be said that growths of the cheek are fairly sensitive to Radium, except when they are very superficial and of the leukoplakic type. The softer and more fleshy the growth, the more successful will Radium alone be with its cure. The harder and more approaching to leukoplakia is the growth, the less effective is Radium. For this latter type of growth, we employ an excision with diathermy, followed at once by the insertion of Radium needles around the edge of the growth, a few milligrammes of Radium being inserted in the intervening space originally occupied by the growth (Fig-1)

A growth of the size and shape shewn in the diagram should have Radium needles inserted in a pattern such as that indicated, the dangerous and unknown growing edge is first dealt with, and the intervening space, radiated in part by the cross-fire of the surrounding needles, may require only a few mgms of Radium. In general it may be said that Radium needles of 1 cm active length each containing 1 mgm of Radium element, if placed 1 cm apart, should be in a cheek for 10 days. That is to say, each cubic centimetre of epithelioma requires approximately 250 mg hours of Radium. This is not a strictly accurate statement, and I prefer personally not to talk or think in "mg hours", for double the strength of Radium mentioned (i.e. 2 mgs per 1 c.c. active length of needle) has much the same effect in 4 days as the single mg needles have in 10 days. A 5 mgm needle of 3 cms active length is just about twice as effective as a 3 mgm needle of the same length. For a soft growth in the tongue or lip or any fungating growth, 1 mg Radium per 1 c.c. of tissue is effective in about 8 days. It is advisable always to add 20 or 25 per cent to the estimated amount of Radium in case of irregularities in the distribution of the needles, or unexpected radio-resistance of the tissue.

Large, fungating growths of cheek or lip can have the fungating part removed by the diathermy knife, in order to save Radium, which is used for

the non-projecting part of the growth and the tissue immediately around its edge. This method leads to a worse cosmetic result than the use of Radium for the entire growth. Some of the normal tissue is destroyed by the diathermy which radium, used alone, would preserve. But by this method more Radium is available for the other cases who are waiting for it in hospital, in our fight with grim death we cannot often think too much of cosmetic results.

With regard to the removal of glands, which is the routine in all cases of cancer of lip and cheek, that will be described later. It is always done by operation, though occasionally with the employment of Radium as well—i.e. in conjunction with operation, and as a reinforcement to it.

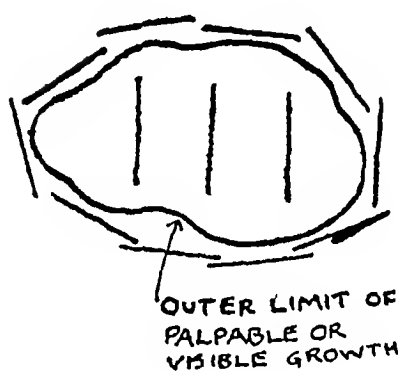


Fig. 1

Distribution of Radium  
needles in a growth  
2.5 x 5 cms

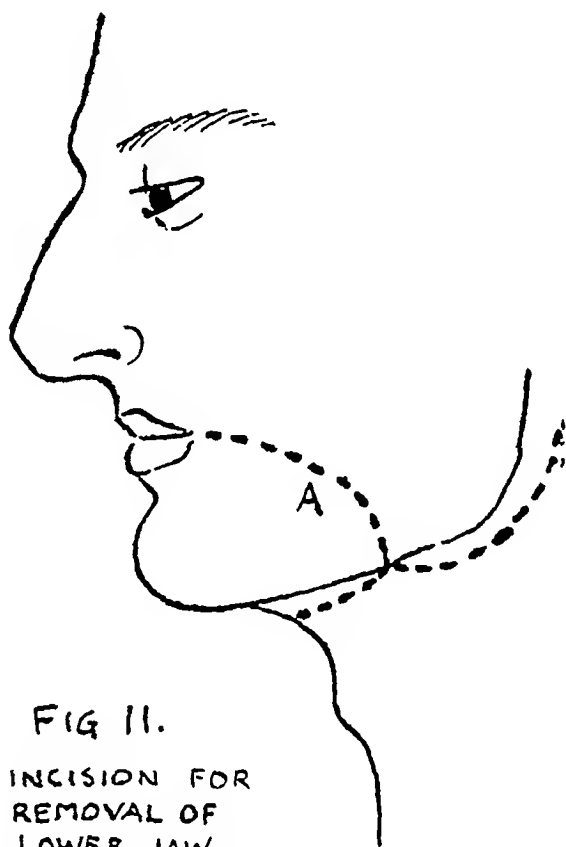


FIG 11.

INCISION FOR  
REMOVAL OF  
LOWER JAW  
SKIN NOT INVOLVED

Where cancer of the cheek is very near to the bone of either jaw, radium will very often have to be inserted close to the bone, and a sequestrum will later be formed in some cases, the superficial layer of the bone being killed by the radium. The extraction of the teeth contiguous to the growth should be done at the same time as the removal of the glands. It should never be done beforehand, or even at the time of insertion of the radium, for cancer cells may become implanted in the sockets of the teeth,

and lead to a carcinoma of the jaw some months later. Twenty years ago, when fresh from the teaching hospitals of England, I used to remove teeth in order to clean up the mouth for subsequent surgical procedures, but so often did I notice the occurrence of this implantation-cancer of the jaws, that I gave it up, and never practise it now, however dirty and septic the teeth may be.

The prognosis of radium-treated carcinomata of the cheek is very good, so long as radiation is sufficient. A small radium burn is not of serious import, and can be treated later by diathermy. Under-radiation on the other hand is certain to be followed by recurrence, and the recurrence may be resistant to radium treatment.

Two or three weeks after treatment, the cheek must be examined, and the presence of a superficial ulcer of smooth, "wash-leather" appearance extending over the whole of the area originally occupied by the growth (and a little beyond it) means that treatment has been adequate. It is partly in order to keep the patient long enough for this to be observed that I invariably operate upon the glands after, and not before, the growth has been dealt with. The other reason for this is that if the glands draining a cheek are removed before the growth is dealt with, the lymphatic drainage of that cheek will be diverted into new channels, such as to the pre-auricular gland on the same side, or the submaxillary group on the other side, and secondary growths may appear in these situations later.

2 *Lower Jaw*—The lower jaw is but seldom suitable for the use of radium. Occasionally in patients who have refused operation but submitted to radium treatment, I have been constrained to use radium. But the result has always been the same. If the cancer is destroyed by the radium, the jaw will also have been destroyed, and eventually, perhaps months later, will have to be removed. I remember a tragic case of a fine-looking man who implored me to radiate his lower jaw, and not to operate upon it. I did so, and the cancer disappeared. But the jaw started necrosing, and a few months later had to be removed. The patient stood this operation well, but developed an abscess of the lung, from which he eventually died. Patients with cancer of the mouth stand one or two anaesthetics well, but not many more, and those requiring a series of operations (such as plastics, etc.) very often develop abscess of the lung after their fourth or fifth operation. For this reason it is my rule to do everything possible in one single operation, and to remove in one block the half-jaw including its condyle, submental and submaxillary glands with the salivary submaxillary, and the large upper deep cervical gland usually known as the tonsillar gland. In most cases this will be sufficient to "cure" the case—a word I hate to use about cancer, but you know what I mean. But if there be any involvement even of one single deep cervical gland, the case should later have a complete block dissection of the

deep cervical area, with part of the sternomastoid muscle and the anterior and posterior cervical glands. The jugular vein can nearly always be preserved, and this should be done, for its removal leads to cerebral congestion in a certain proportion of cases, many of whom eventually die from it a few days after operation. If the vein has been adherent to the glands, a few radium needles should be inserted alongside it at that place immediately the operation is finished and before the skin is sutured.

Technique of the operation —

Anaesthetic (1) Chloroform inhalation for most cases

Occasionally (2) Basal paraldehyde by rectum, with both local novocain and especially injection of novocain into foramen ovale

(3) Ether in olive oil by rectum

We have not found that our mortality, either immediate (shock) or remote (usually pneumonia or lung abscess) is materially cut down by any method, and therefore usually use Chloroform, with laryngotomy immediately after induction.

*After Laryngotomy*, the throat is packed with gauze, well pushed back, a single swab of  $5 \times 9$  inches of 16 thicknesses of gauze being used. The laryngotomy tube is left in for one or two days after operation.

*Incision* —The text-book middle-line incision, carried round the jaw to its angle, is not used, it is often followed by sloughing of the lower lip, for an accessory horizontal incision from the angle of the mouth is nearly always necessary, and the facial and coronary (infra-orbital) blood supply are thus both cut off. The incision shewn here (Fig II) is hardly ever followed by any sloughing, and lends itself to the formation of suitable flaps to fill up the gap if such exists as in Fig III.

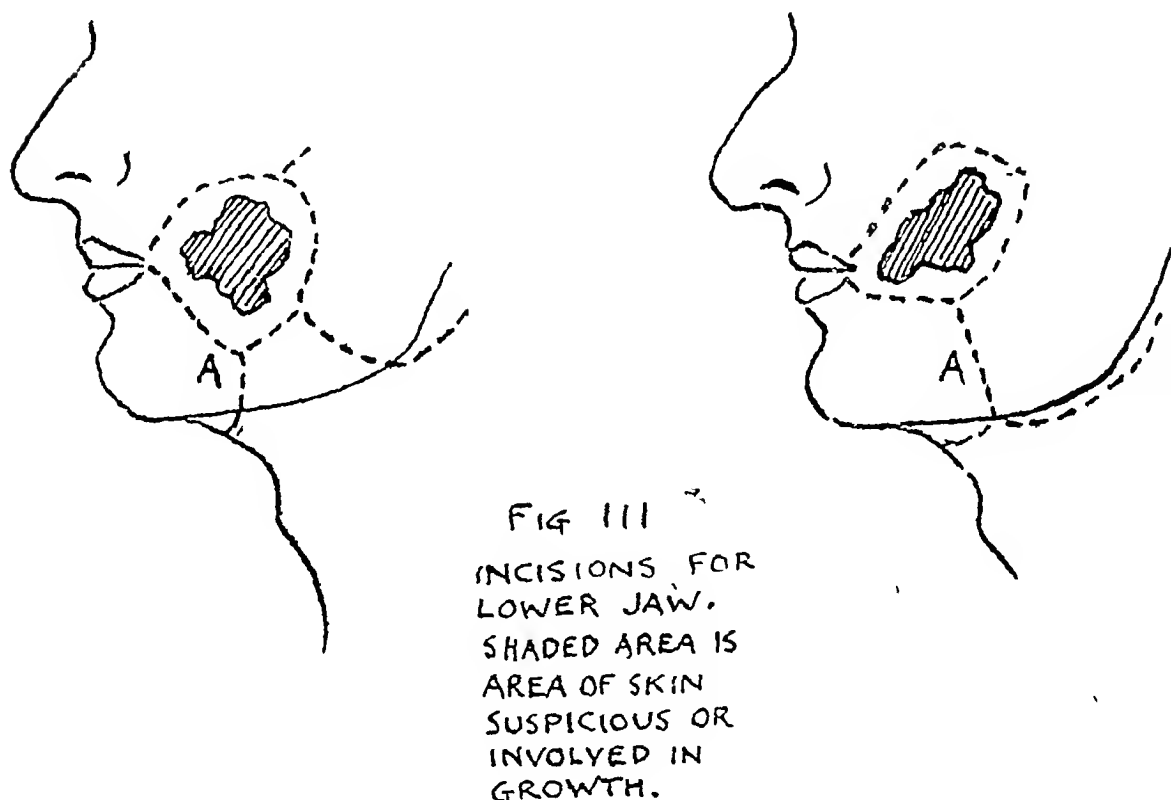
*1st Stage* —The incision is deepened to the bone at A, and extended forwards and backwards as shewn, for the removal of the submental glands (diathermy knife is useful here) and the separation of the submaxillary salivary gland from below. The tendon of the digastric is cut, and a finger enlarges the space above the digastric tendon and deep to the gland, until the facial artery is seen. This is clamped.

*2nd Stage* —The jaw is cut, at least  $\frac{1}{2}$  inch beyond any trace of carcinoma, with a Butcher's saw, a tooth being extracted at the point chosen for section of the jaw.

After being cut half-way through, the division is completed with a Horsley's Bone-cutter, and the jaw is separated from the tongue with the

Diathermy knife, at a proper distance from the growth (which often involves only the outer table of the jaw, and hence need not be considered at this stage) In bad cases in which the floor of the mouth is involved, some portion of the tongue may also have to be removed or treated with Radium

Separation of jaw from tongue is done at this stage as far back as the last molar tooth, and the facial artery is cut and tied, the cut half of the lower jaw, submaxillary salivary and lymph glands, and submental glands with the anterior belly of the digastric should be together in one block There is a gland near the common facial vein, close to the jugular region, which must always be removed in this block with the vein adherent to it Deep cervical glands must not be removed, the carotid canal must be left intact, or it may get infected and set up mediastinitis



*3rd Stage*—Separation of the jaw (and cheek if involved) on its upper and posterior sides The incision, at least half an inch at all points from the apparent edge of the growth, cuts through skin only, and then skirts the outer surface of the masseter muscle until the posterior edge of the jaw is reached Here the transverse facial artery must be cut The parotid gland is cut straight through when convenient The incision on the mucous membrane of the cheek, well clear of growth, separating the growth from the upper jaw, is then done with a diathermy knife, until it meets the lower

(floor of mouth) incision just behind the last molar, or at least  $\frac{1}{2}$  inch behind any growth there may be in that region. The masseter muscle is boldly cut through (near the zygoma if it is involved in growth, but much of it can be left in other cases, and is of use in filling the maxillary space). The upper portion of the masseter is retracted upwards to expose the temporal process of the jaw. This is cut with Horsley's forceps, and separation on the outer side of the jaw is complete. The deep temporal artery, and masseteric artery will require ligature.

*4th Stage*—The incision in the mucous membrane of the cheek is deepened, and the buccal pad of fat removed, until the pterygoid muscles are laid bare. These are divided high up, near the maxilla, from behind forwards until the inferior dental nerve is seen. Just behind it (between it and the ramus of the jaw) is the artery (inferior alveolar), a branch of the internal maxillary coming off at the neck of the condyle of the jaw. Clamp and cut the nerve and artery, and pull slightly on them upwards when the internal maxillary artery will be seen as a white band running round the neck of the condyle (Fig IV). Clamp it in two places, and cut through it (between the clamps) and through the muscle covering the condyle. The condyle can now be easily dislocated, portions of pterygoid, temporal, or other muscles still adherent to it can be divided, and the jaw should be free to be removed.

*Arteries to tie*—Two cut ends of internal maxillary, and some of its branches, the middle meningeal being that which most commonly causes trouble, being rather difficult to catch in forceps and tie. A tight ligature round the inferior dental nerve stops a lot of post-operative pain. In some cases, especially in women, the condyle of the jaw can be dislocated outwards, and removed without cutting or tying the internal maxillary artery. Venous haemorrhage is sometimes troublesome in the maxillary fossa, and this can often best be dealt with by the suture of the region of bleeding over and over with catgut in a fully curved medium-sized needle.

*5th Stage Reconstruction of the mouth*—In a case in which there is not involvement of the whole cheek, and half an inch or more of the buccal mucosa is left in its upper part, the floor of the mouth is sutured with interrupted Connell's sutures of catgut, to this. The first stitch is taken in the posterior end of the cut mucosa, near the anterior pillar of the fauces. When this suture reaches the region of the premolar teeth, another series of stitches (interrupted or continuous) is taken, uniting the front part of the cut floor of the mouth to the mucosa inside the lower lip. These two lines of suture meet in the premolar region, leaving an inch or so of mucosa leading to the upper and lower lips, which are united by catgut sutures everting the mucosa,

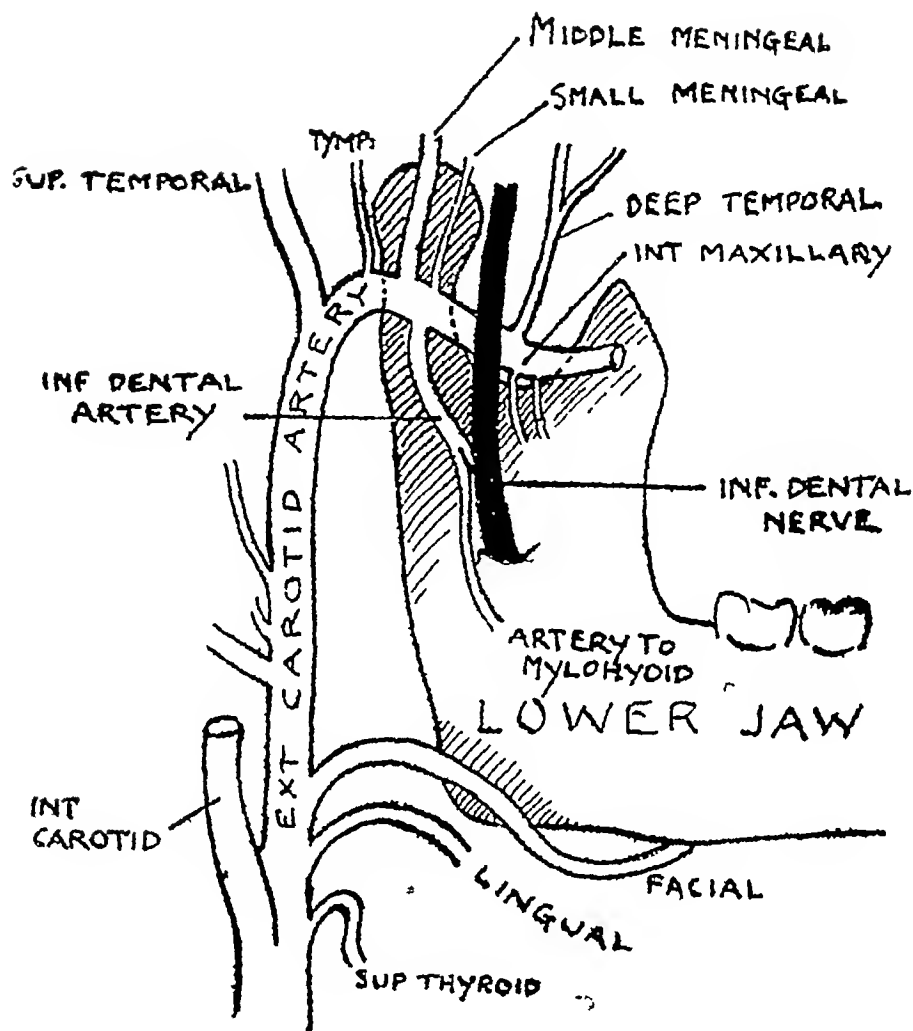


FIG. IV INT MAXILLARY ARTERY, VIEWED FROM

The repair of the external wound is easy if no skin has been removed, but if a large area of involved skin has been sacrificed, it may require some ingenuity to find the best arrangement of stitches. In general, it is best to unite the skin *above*, leaving any gap there may be in the *lower* part of the wound, where drainage is wanted, and where no reinforcement of the inner (mucous) suture is needed. In no case must the wound be closed completely. At least 1 to 1½ inches of the lowest part of the wound must be left open, and the wound packed gently with flavine gauze. Drainage tubes are useless, as they so often fill up with clotted blood. Since we adopted this half-open method with the wound packed, our mortality has been halved. Shock and sepsis should kill very few patients, pneumonia and abscess of the lung is the chief cause of the death.

Two methods we have found very useful and life-saving in cases of pneumonia after these and other operations are the following —

(1) On the appearance of any sign of bronchitis, such as coughing, tightness in the chest or crepitations in the lungs, a daily injection of 20 c c of 20% alcohol in normal saline is given intravenously. Many cases of pneumonia are aborted, and not a few prevented altogether, by this method.

(2) If the patient finds it difficult to cough, and saliva or phlegm rattles in his throat, turn him over, so that he lies almost prone, with a cushion under his chest and the foot of the bed blocked and no pillow under his head. The breathing at once becomes smooth and regular, and there is no danger of inhaling infected saliva.

Swallowing may be difficult in these cases, and feeding by a cup to the spout of which is fixed a tube which goes to the back of the tongue (so-called tube feeding, but not the passage of a stomach-tube) is often necessary. As soon as solid diet can be swallowed with comparative comfort the patient must be allowed some solids of wholesome nature—biscuits and iddali are among the best.

The mouth is washed out several times every day, especially after every meal, until healing is almost completed. Water, dilute carbolic acid, or dilute Dettol are used for this purpose.

3 *Tongue*—Most carcinomata of the tongue are best treated by the insertion of Radium needles alone, if they are not too large, but those in which the whole tongue is involved do not do so well, pneumonia being very common after the insertion of a large number of needles in a soft growth, and secondary (implantation) carcinoma of the lung is by no means a rare sequel.

If the whole tongue is involved, but not the lower jaw, and if the glands in the neck are only slightly involved, I usually excise the tongue and apply Radium needles to the base, a strong dose for a short time being best (say 40 mgm for 3 or 4 days). In these cases a radical gland operation of both sides of the neck will have to be done, of course. The tongue reacts very well to Radium, and if the needles are inserted in pairs (2 mgm needles pushed in from the front, and anchored by a shorter (1 mgm) needle in the back of the tongue) they hardly ever come out before they are due to be removed (Fig V).

Needles are never inserted for more than 10 days, and a stronger dose for a shorter period is better. As in the case of the cheek, 1 mg radium per 1 c c of growth for 10 days, or twice this strength for 5 days, is the rule. There is no need to screen the rest of the mouth from the radium as is done in some clinics. As well as being tied together in pairs, the needles should

be tied to a catgut stitch sewn through a part of the tongue near the tip which is not involved in growth, if possible. The threads attached to the needles are surrounded by a firm rubber tube to prevent the patient from biting them. When they are removed, teeth can be extracted, but not before, lest cancer cells be implanted in their sockets. A few days later the glands should be operated, with reinforcement of Radium in doubtful situations if necessary.

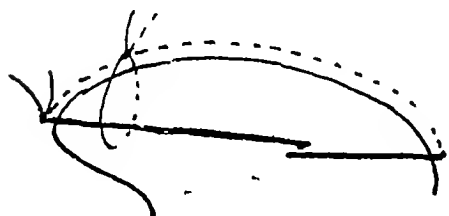


FIG V. TONGUE -  
RADIUM NEEDLES

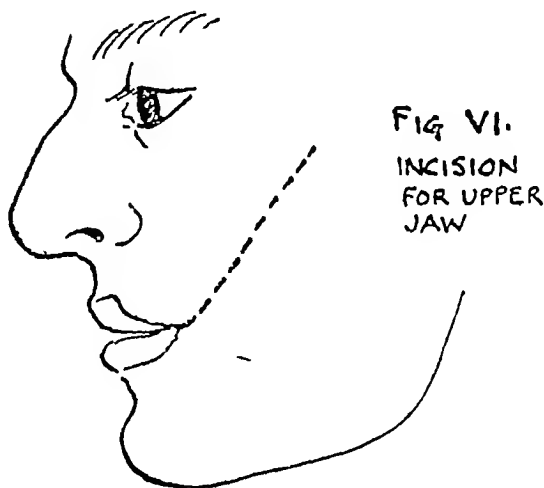


FIG VI.  
INCISION  
FOR UPPER  
JAW

Long radium needles can be inserted into carcinomata of the tongue from the lower part of the chin and along the inner side of the maxilla. In some cases this is the best way of radiating a tongue, if the growth is too soft to hold needles, or if the patient has great difficulty in eating or drinking, I often insert needles through the skin below the lower jaw. In cancer of the back of the tongue, or of the epiglottis, needles of 5 mgms, active length 3 cms, inserted just in front of the angle of the jaw, but behind the facial artery, can easily be made to reach the extreme back of the tongue. Some sloughing of muscles supervenes, and neuritis of the lingual nerve may cause pain for a few days, after the needles are removed a small incision for drainage of the pus which surrounds them is advisable. The submental and deep cervical glands must be removed by operation, the radium will have rendered innocuous most of the submaxillary group of glands. Growths near the tip and sides of the tongue require 25% more radium per 1 c c of growth than do those near the back of the tongue.

4 *Upper Jaw*—When this is involved in cancer spreading from the cheek, the alveolar and palatal part of the jaw is usually affected, the antrum is often free from growth, and the orbital floor is quite uninvolved.

In these cases, the jaw should be removed by operation.

*Incision*—A straight incision upwards and backwards (Fig VI) from the angle of the mouth is sufficient for most cases. The upper lip is drawn

up, the buccal mucosa incised as far as is necessary, usually to the middle line, the tissues of the cheek are separated from the bone of the maxilla until the nostril is entered beneath the flap of skin. If the growth does not reach the middle line of the palate, the central incisor tooth is drawn, and with a diathermy knife the palate is divided (at least half an inch from the growth), as nearly as possible along the line of the nostril. The anterior and outer walls of the maxilla, just below the orbital plate and upper end of the antrum, are cut through with Horsley's forceps. The root of the zygomatic (malar) bone is divided. The separation of the growth (with margin) from the mucous membrane lining cheek and covering soft palate is completed with a diathermy knife. The soft palate can often be preserved, but may have to be removed. The growth is now attached only by the posterior end of the maxilla and the pterygoid process of the sphenoid bone, firmly welded to the maxilla. One bold cut with the Horsley forceps severs this bone, and with it the internal maxillary artery. The jaw with its growth is at once removed, a few snips of the curved scissors being sometimes necessary to free it here and there. The internal maxillary artery is at once stopped from bleeding with a Michel's clip, which presses its cut end against the pterygoid bone. This clip is left in, and makes its way out in a few days' time. There is occasionally a secondary haemorrhage from this artery (4 total cases in our series of 349 upper jaws).

There should be practically no other bleeding. A swab is packed into the cavity and firmly held there for a full minute. A careful inspection of the removed portion will show whether in any place the removal has been dangerously near the margin of visible growth. Diathermy or radium is employed to deal with such doubtful places, or an extension of the operation may have to be made. The time for this operation is about 10 minutes.

If the orbital floor is involved in growth, a much more extensive operation is required on the lines of the text-book operations for removal of the whole upper jaw. The eye should also be removed in most of these cases, as diplopia is certain to result.

If however the eye is to be left behind, the upper incision should go through the conjunctiva behind the lower eyelid, if the incision goes in front of the lid, scar tissue will pull the eyelid down later and cause Epiphora and Ectropion. The infra-orbital artery is then clamped and tied. But in many of the worst cases the cheek is so badly involved that a large amount of skin has to be removed with the jaw, and plastic operations will have to be done later. Whatever operation is done, the last portion of the jaw to be cut is that part which involves the internal maxillary artery. If the whole separation of the jaw except for the pterygoid portion has been completed, the jaw can then be instantly removed, and haemorrhage from the internal maxillary artery can be stopped almost at once. If the case is kept under

observation for some months, an excellent view is obtained, from inside the mouth, of all places where recurrence of the growth is likely to take place. Radium and/or diathermy are requisitioned at once for any suspicious area.

5 *Glands*—If the growth and glands cannot be removed at the same time, it is a sound general principle to operate on the glands only after the growth has been either removed or rendered innocuous by radium.

There is a risk, of course, of the patient running away before the glands are dealt with, but that can often be avoided by pretending that an anaesthetic is necessary for the extraction of the radium needles, or by keeping the patient unnecessarily in bed. The greater risk is run by dealing with the glands before the growth is operated upon, the growth, being still active and in situ, develops new lymphatic drainage, and may involve a new group of glands, for instance, a cancer of the cheek normally involves the submental and submaxillary glands, if these are removed lymphatic drainage is diverted to the pre-auricular gland, the lymphatic gland in the lower pole of the parotid, and even to the submaxillary glands on the other side or the deep cervical group on either side.

During the first few years of my life in India I used to operate on the glands before the growth, but this transference of the drainage to other groups of glands, and the appearance of cancer in them, occurred so often that I soon gave it up, and I never do it now.

With regard to the question of which glands should be removed, this depends of course to some extent on their involvement. Cancer of the cheek region, including lips and jaws, tends first to involve the submental and submaxillary groups, and an isolated gland near the common facial vein. Very occasionally the tonsillar glands in the upper deep cervical group is involved. Beyond the glands mentioned there is a layer of fascia which, though in places very thin, acts as a boundary for sepsis, it is safe to remove all these glands in a lower jaw operation, without risking infection of the carotid sheath, and its serious sequel of anterior mediastinitis (Fig VII).

In the cheek, lip, or jaw case in which there is no palpable enlargement of any glands at all, it is sufficient to remove this group. In an early cheek case I remove only the submaxillary and submental glands but always at least these two groups, the submental group being dissected out with the diathermy knife. If there is involvement of only a few of the submental or submaxillary glands, the upper deep cervical glands must also be removed and the case must be kept under observation. A complete block dissection of the neck is a risky operation to a patient who is either septic or debilitated by a previous removal of a lower jaw, and the relative risk of leaving the glands behind, and of subjecting the patient to a  $\frac{3}{4}$  hour anaesthetic or a risk of mediastinitis, must be weighed. Radium can sometimes be used to attack these glands if a block dissection be considered too dangerous.

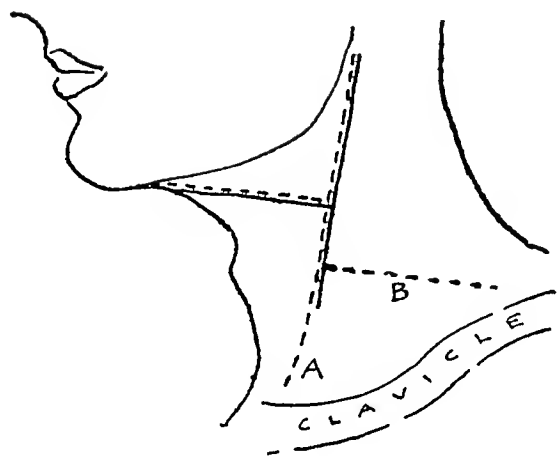


FIG. VII  
INCISION FOR  
GLANDS  
— FOR CHEEK  
.... TONGUE



FIG. VIII  
RADIUM NEEDLES  
ON INT JUGULAR  
VEIN

In the case of the tongue, a relatively much more extensive gland operation must be done. As a routine, if no palpable involvement of glands can be made out, and the cancer is of fairly small size and confined to one side of the tongue, I make a practice of removing submental, submaxillary, and deep cervical (anterior) glands down to the omo-hyoid muscle. If at operation any of these are found to be involved, the operation is extended. The incision is extended down to the clavicle (A) over the sternomastoid muscle, this muscle is defined front and back, isolated from the jugular vein in the middle third, and divided just below the spinal accessory nerve. The two halves are retracted up and down, and an excellent view of the glands beneath it is obtained. These are all removed, together with adherent muscle or vein. The vein is only removed if its compression produces no symptoms and if it is really adherent to glands. It is safer to leave it behind if it be very large, and to peel the glands off it, leaving radium needles along its length of a suitable dose (Fig VIII), usually about 14 mgms for 8 days.

If any single deep cervical gland is found to be enlarged and obviously malignant, a complete removal of all deep and posterior cervical glands should be done. An extension of the incision over the brachial plexus region (B) may be required (Fig VII)

In a jaw case this extensive removal, if found to be necessary, should only be done when the jaw operation has healed sufficiently well to render the danger of sepsis in the carotid sheath fairly remote, drainage of the lower end of the wound is necessary for a few days

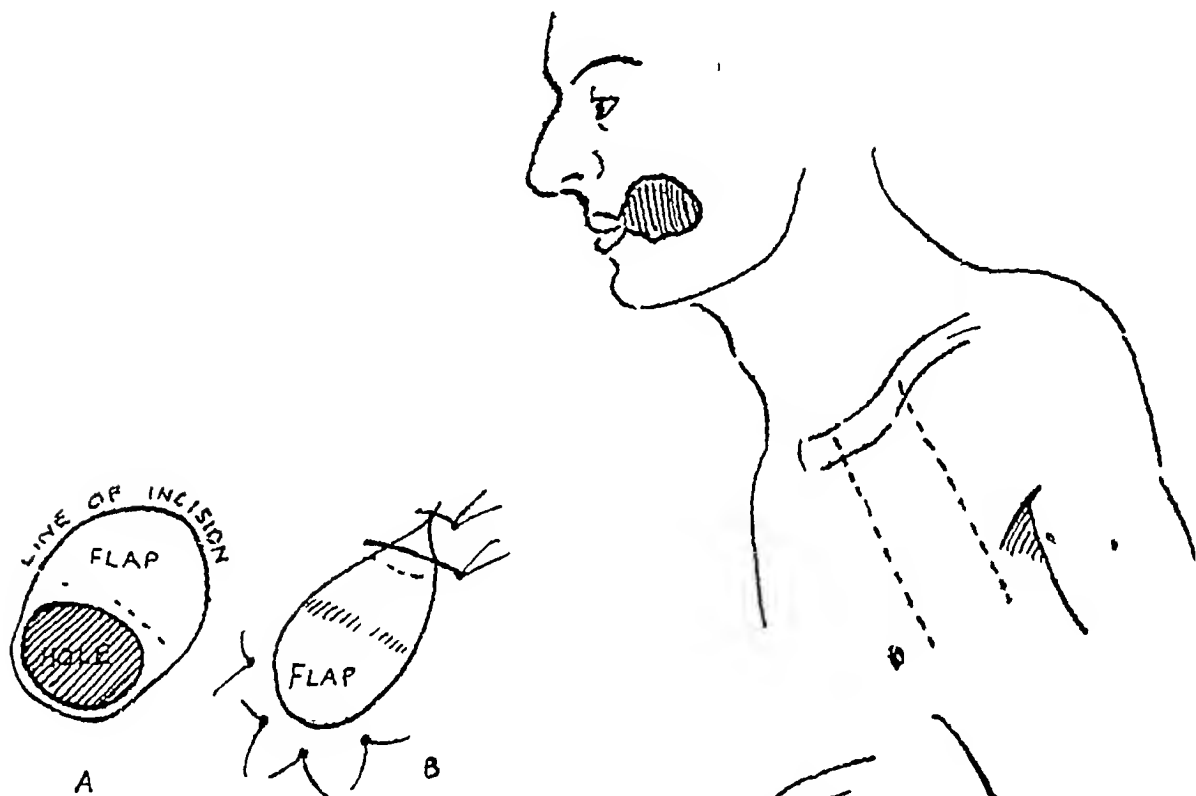


FIG IX FILLING  
GAP BY FLAP

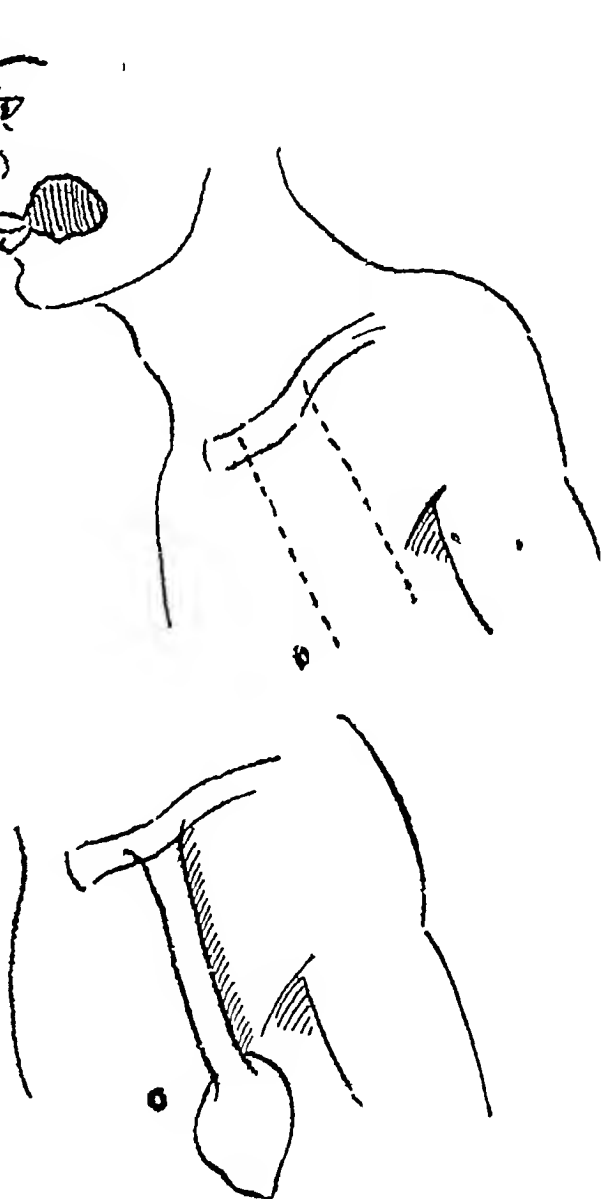


FIG X TUBE FLAP  
INCISIONS

The upper jaw drains into the pre-auricular, parotid, buccal, and sub-maxillary glands, and only these glands need be removed unless any involvement of them indicates a wider removal advisable. These cases must always if possible be observed at least once a month for six months, and thereafter once every 2 or 3 months for 2 years.

*Plastic operations*—Many cases of cancer starting in the cheek will require removal of a large piece of the cheek leaving a gap, in lower jaw cases especially is this frequently necessary. After the wound has attained a healing condition, *i.e.*, when the size of the inevitable gap is apparent, plans must be made for its closure by plastic operations. The inner side of the cheek must be formed either by mucous membrane or by skin. In women, this skin can often be supplied by (Fig IX) turning in flaps from the edge of the gap, or by a sliding flap. In men this is rarely possible on account of the hair on the skin, and for most male and some female cases a tube-flap from the chest is necessary. The base of the tube is best at the clavicle, the distal end should lead to hairless skin between the nipple and the axilla, the two incisions isolating the tube must provide a good tube, and must therefore be in no place less than 2" apart (Fig X).

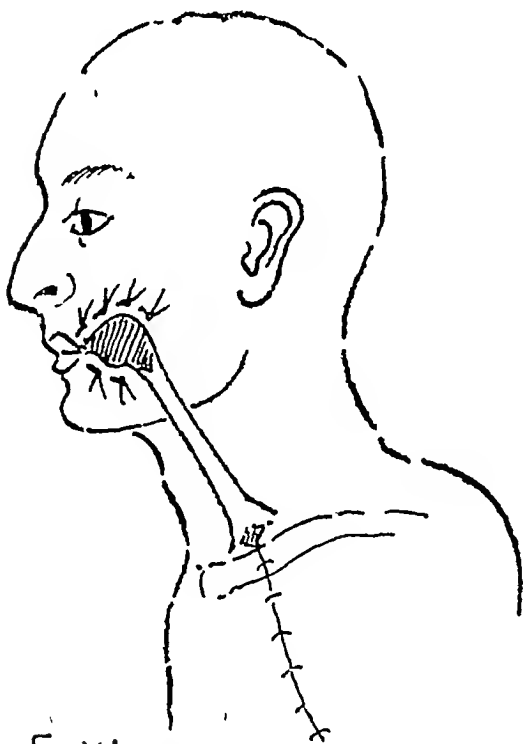


FIG XI INSERTION OF FLAP

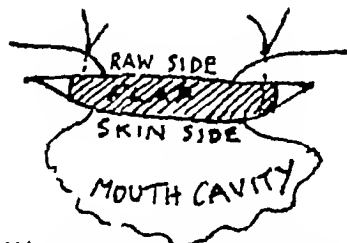


FIG XII INSERTION OF FLAP INTO GAP—SECTION

In forming the tube, interrupted sutures of fine silkworm gut are used, put in from alternately the right and left sides of the tube, to prevent

torsion of the tube which occurs if all the sutures are put from one side. The skin of the chest wall is undercut if necessary, to enable it to join up. Usually a tube is healed in three weeks, and within a month after its first operation it can be used as a stalk to carry a leaf-shaped piece of skin to fill the gap. This piece (Fig X) must not be too large, or its edges will die, and a tiresome third operation will be necessary if the second fails. Gillies' rule is always useful in these and other plastic operations—"Never try to make a flap do too much." The skin around the gap is undercut for  $\frac{1}{2}$  inch and the "leaf," skin inwards, is sewn to the undercut, raw surface to raw surface, by mattress stitches of silkworm gut (Figs XI, XII). Too many stitches should not be put in. If the graft "takes," the stalk can be cut away in 3 weeks or so and some of its skin used as a thiersch graft to cover the raw area on the "leaf." Sometimes the stalk itself, detached from the clavicular region, is useful to repair extensive defects, especially if they involve the lip.

One of the chief advantages of the tube flap-operation is that it keeps the patient either in hospital or under observation for a critical three months, during which recurrences must be looked out for. For other plastic methods, attention is called to Gillies' book "The plastic surgery of the face." Much ingenuity and patience may be necessary to repair a bad defect, but patients usually co-operate well, and during the time occupied by plastic surgery, all that is possible can be done to the glands.

Table. A.

		No.	Percentage of total
Primary operations	Epithelioma of cheek and lips	2533	52
	„ „ Tongue	633	13
	„ „ Upper jaw	349	7
	„ „ Lower jaw	1338	28
Secondary operations Glands in neck		2590	
Plastic operations and tube flaps		996	
		<hr/>	<hr/>
		8439	100

1923—1942 Table of Mortality of operations for Cancer (B)

Site of growth	No. operated	Deaths while in hospital	Percentage	Remarks of chief causes of death
Cheek and lips .	2533	5	0.2	..
Tongue	633	12	2.0	Pneumonia
Upper jaw ...	349	12	3.4	Sec. haem. & pneumonia
Lower jaw ...	1338	114	8.5	Pneumonia, abscess of lung
Glands in neck ...	2590	13	0.5	Cerebral congestion
Plastic operations etc	996	2	0.2	Abscess of lung
Situations other than mouth				
Breast & glands ..	113	3	3	.
Penis & glands ...	171	2	1.3	Sec. hge femoral
Rectum ...	48	4	8.3	op shock or sepsis
Larynx & Pharynx.	62	4	6.5	Mediastinitis
Cervix (mostly radi- um cases) ...	558	11	2	.....

*Note* —“Deaths while in hospital” includes deaths as an immediate result of operation, or during the first few weeks after operation. The large majority of the deaths except in the rectum cases fall under the latter category

*Mortality* (see table B) —In this series of cases it must be remembered that many hundreds of cases have been dealt with which I was brought up in London to consider inoperable. The death from cancer of the mouth is so horrible that many patients ask me to operate on them “even if it will kill me,” and if thus invited to do so, I usually obey the call of humanity and neglect that of statistics. The appended table shews the mortality of the various types of epithelioma mentioned in these pages, the cause of death being hardly ever operative shock, but nearly always pneumonia, abscess of the lung, or congestion of the brain following ablation of the internal jugular vein.

*Radium versus X-rays and operation* —I have seen so many tragedies caused by the treatment of cancer of the mouth with X-rays, that I am very doubtful of the advisability of treating any case of carcinoma of the buccal and nasopharyngeal cavities with X-rays. Nearly every one of the cases I have been personally in touch with who have been treated by deep X-ray therapy have eventually had a recurrence of the growth either locally or secondarily, or have never had sufficient radiation of some part or other of growth or glands. In addition to this, X-ray therapy always has some ill effects on the general health of the patient, and these effects may be profound in some cases, reducing them to a condition in which they cannot stand the further treatment, perhaps involving anaesthesia, for Radium or

operations, which may be necessary for their cure. The ability of X-rays and radium to cause the start of a new growth if a certain dosage be given is also a factor to be considered.

These secondary new growths develop only in certain few individuals, as a response to a dose of X-rays or radium which probably varies with the individual. In cases of carcinoma of the cheek or tongue which have been treated with Radium of correct dosage, by insertion of needles, I have noticed that carcinoma, if it develops in this way, starts approximately 4 to 5 centimetres from the edge of the radiated primary growth, at least 6 months after the radiation is done. It appears to occur in this way in only 1% or less of cases.

On the whole I would appeal for operation to be the normal recognised treatment for all cases of upper and lower jaws. Radium is the best treatment for cancer of tongue or cheek, in conjunction, as already mentioned, with diathermy or operative removal of certain types of growth such as large fungating whole tongues, and epithelioma of the leukoplakic type.

### Special Situations

(1) Involvement of the lower jaw with a very extensive carcinoma of the cheek indicates a preliminary radiation of the cheek and upper part of the growth, and removal of the lower jaw by operation. Conversely, an operable upper jaw combined with a fairly extensive carcinoma of the cheek demands radiation of the cheek and removal by operation of the upper jaw later.

(2) Carcinomata in the angle between the jaws is best treated by radium at first, the lower jaw, if necrotic, may have to be removed at a later date.

(3) Carcinoma of the tonsil is the most fatal of all buccal carcinomata, owing to its early involvement of the deepest cervical glands, and is usually best treated with radium for both glands and growth. Care must be taken not to put needles into the carotid arteries. Long needles, inserted from outside, near the angle of the jaw and in front of the carotid arteries, should be used. If the glands do not involve the carotid artery they should be operated upon, but radium will probably be necessary as an adjuvant to the operation in doubtful places and in the deepest layers.

(4) Carcinoma of the epiglottis is another very fatal variety, owing to its early involvement of the deepest glands. Needles 5 cms long should be inserted from both sides near the angle of the jaw, and as complete a gland operation as possible should be done.

(5) Carcinoma of the back of the nasopharynx and ethmoid region is very rare, (I have only seen 6 cases) and is best treated by radium. If the extent of the growth is doubtful, a partial excision of the upper jaw may be advisable in order to carry out thorough observation of the growth, which is particularly liable to escape thorough radiation if care is not taken. Of 2 cases I radiated without operation, both died. 1 case which I treated with radium had had deep X-ray therapy one year previously in Madras, died 2 year after beginning of treatment. 3 cases were treated with partial excision of upper jaw. One is alive 10 years after operation, of the others one is untraced, and one is alive 3 years after operation.

### A Final Word

Operation has not the unpleasant after-effects of radiation, and is always the method of choice except for tongue, cheek, tonsil, and a few special situations. An operation which is felt during its course to be insufficient can always be reinforced by radium. Deep X-Ray therapy is very disappointing in all mouth cases. Radium when used must be used in sufficient doses. Just as in the political sphere, so in dealing with cancer, whether by radium or operation, it must always be remembered that error on the side of radicality is always safer than error on the conservative side. One cancer cell left behind will kill the patient, a small radium burn or a little extra mutilation may mean inconvenience, but may mean a life saved.

Another point I would stress is this. All surgeons who operate upon cancer patients should be conversant with the practice and principles of radium treatment. I deplore the separation of so-called "Radium" clinics or institutes from the surgical side in general hospitals. The Radium expert and the surgeon should work hand in hand, and the former should always be prepared to make some radium needles available for the surgeon to use at the time of operation if necessary, especially in cases of cancer of the jaws. It is hard to remember a week or two later exactly what parts of the operation area needed reinforcement with radium, it is easy to insert a suitable dose of radium while the case is still on the operating table.

Finally, I feel we should always remember that our duty is to relieve suffering, and often we ought to put that before the actual saving of life. If Euthanasia is the effect of an operation, it may be the right thing, and is in my opinion always better than insufficiency or neglect. Perhaps that consideration may make our operations more radical and more effective. There is no excuse for a surgeon who does a shoddy or insufficient operation for malignant disease, least of all in a hospital where Radium is available to reinforce operative deficiencies.

### Summary

A series of nearly 5000 cases of carcinoma of the mouth and jaws, involving over 8000 operations, is reviewed mainly in the light of answering the question "what is the treatment of choice, operation, X-Rays or Radium" ?

The treatment most suited to various groups of cases is discussed with reference to epithelioma of

- (1) Cheek
- (2) Lower jaw
- (3) Tongue
- (4) Upper jaw
- (5) Glands of the neck
- (6) Certain special situations

A brief description of some plastic operations essential for the filling up of facial defects left from cancer operations is given

An appeal is made to surgeons to co-operate much more intimately with Radium departments than is usually the case

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# CARCINOMA OF THE BREAST

*(A report of cases treated by irradiation)*

BY

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## Introduction

During the last eight years I have treated 52 cases of cancer of the breast by Deep X-ray therapy only or associated with surgery. We have records of our cases from January 1935. During the first four-year period ending with December 1938 low voltage deep x-ray technique (140 K V to 180 K V) was used, and during the second four-year period ending with December 1942 the higher voltage (400 K V) apparatus was used for irradiation and all the cases treated during this second period received castration dose to the ovaries as well. I have therefore divided the period under review into two sections. I do not apologise for submitting a report on so few a number as 52 cases, as being a private clinic the number treated has to be small. Perhaps the technique of radiation and the results will be of interest. All the cases treated were referred by the surgeon who operated or the surgical consultant who considered operation inadvisable for acceptable reasons.

## Material and Classification

Out of the 52 cases treated, 22 were received during the period—the four years from January 1935 to December 1938, and the remaining 30 cases during the subsequent 4 year-period. The cases treated during the former period were mostly advanced, or with metastasis or recurrences.

I have classified the above 52 patients into the following five groups

- |         |   |
|---------|---|
| Group A | Operable tumour of the breast—treated by radiation only   |
| Group B | Operable tumour—local removal of tumour followed by radiation.  |
| Group C | Operable tumour—radical mastectomy with removal of axillary glands etc, followed by post-operative radiation. |
| Group D | “Inoperable” tumour—radiation followed (3 to 6 months later) by radical mastectomy                            |

*Group E* 'Recurrences,' cutaneous and glandular after operation, and cases with bone metastasis

During the second period of four years ending with December 1942 there were no cases belonging to group E, during the first period, none belonging to group B

### Technique

*Before 1939 (Period I), the technique of radiation was as follows*

For groups A and D, 200 K V 1 mm Cu 1 mm Al filter, two tangential beams of x-rays directed obliquely to pass through the chest wall only, avoiding unnecessary irradiation of the lungs—one beam from the front and another from the back to include the breast and the axilla, 200 r per day alternately from the front and the back for 28 consecutive days giving a total of 5600 r

For group C, 180 K V, 0.5 mm Cu and 1 mm Al filter, 200 r daily, obliquely directed to pass through the chest wall over the operative field, giving a total of 1800 r and for the axilla at the same tension and filter a dose of 2400 r (two fields) No radiation was given to the ovaries between January 1935 to December 1938 (as a routine) in all the cases treated

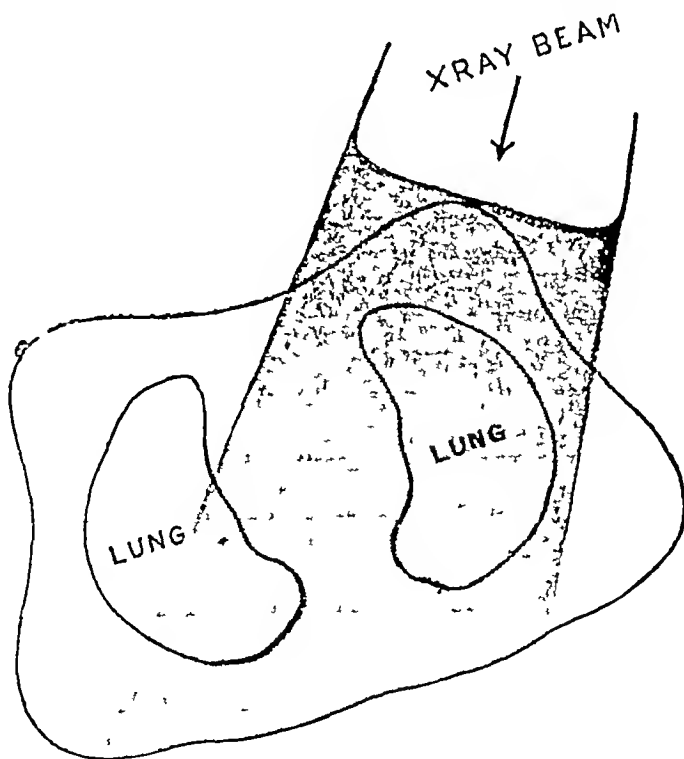


Fig 13 (Schematic drawing) Indiscriminate direct radiation of the breast is shown. The whole body is unnecessarily in the path of the rays—danger of pulmonary implication. This is the wrong and dangerous method.

The 'second series' of cases under report were those received for treatment during the 4 years between January 1939 and December 1942. The 400 K V apparatus was installed at the end of 1938, and the technique followed is described below. Irradiation of the ovaries to bring about an artificial menopause was adopted as a routine in these cases. End results have been quite satisfactory in these second series of cases. Perhaps the follow up of cases has also been better.

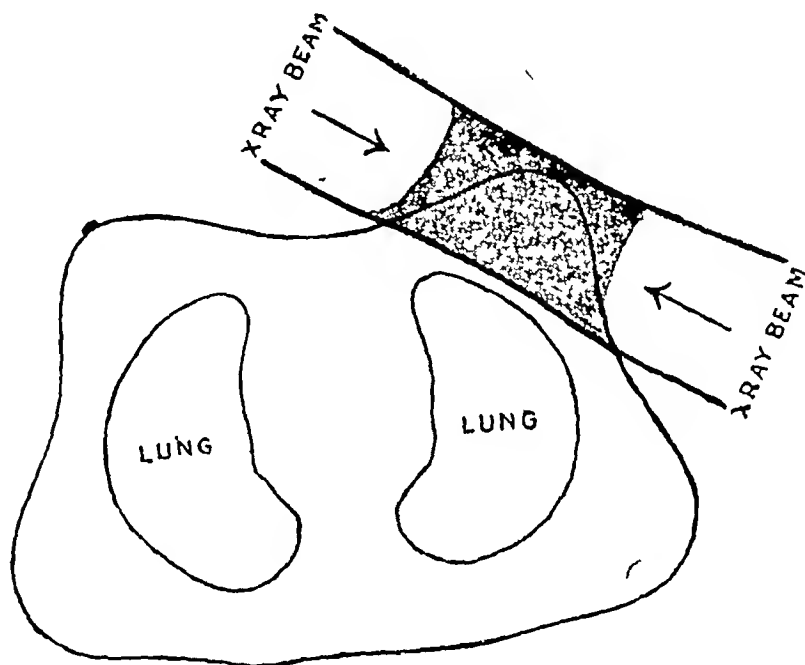


Fig 14 (Schematic drawing) Tangential method and its advantages, only the breast and chest wall are subjected to intensive radiation, the x-ray beam does not pass through the lungs. This is the correct method.

*Irradiation to the ovaries* It is well known that the ovarian secretion is intimately connected with the physiological and metabolic processes of the breast, particularly during the menstrual life of the woman. The oestrin of the ovary stimulates the growth of the epithelial structure of the breast, causing hypertrophy and hyperplasia, this stimulation may sometimes be so intense as to produce chronic cystic mastitis or even proliferation of epithelial cells. If this stimulation is not allowed to occur, the intensity of the malignant disease in the breast will decrease. Experience has shown that cancer of the breast is more malignant and more refractory to treatment in a young person with actively functioning ovaries than in an elderly woman past the climacteric whose ovarian functions are at a very low ebb. Hence irradiation of the ovaries with a permanent castration dose has been advocated and

practiced in order to prevent recurrence of cancer and to cause regression of metastases

Method of irradiation of the ovaries with Deep x-rays is as follows

400 K V 5 mm Cu 1 mm Al filter, hypogastric field to include both the ovaries—a daily dose of 200 r on the skin for 8 or 10 consecutive days to deliver a cumulative depth dose of 400 r to the ovaries

*Irradiation to the Breast* For groups A, B and D, the dosage of radiation was between 4800 r to 6000 r directed to the breast and axilla through one medial tangential skin field (breast lifted up on a sandbag)—tension of 400 K V and 5 mm Cu 1 mm Al filter. The skin takes this dose well—only a moist desquamation resulting from the radiation, this heals up in 3 to 6 weeks' time. The axilla receives about two-thirds of the dose delivered to the breast.

The severe "radio-epidermite" reaction that one observes with the usual lower voltages of 180 K V and the thin filter of  $\frac{1}{2}$  mm Cu is absent when the higher voltage and the higher filter technique is adopted. The fibrosis is also less.

In Group C, the operative field gets a daily skin dose of 200 r with a tension of 140 K V and  $\frac{1}{4}$  mm Cu 1 mm Al filter until a dose of 900 to 1200 r is given—this directly over the chest through an anterior field. The amount of radiation that reaches the lungs is small and does not injure the lung tissue. The axilla gets 300 r daily with the higher voltage apparatus (400 K V 5 mm Cu 1 mm Al filter) for 12 days until 3600 r are delivered.

All cases in the second series got irradiation for the ovaries first. This was followed by radiation to the breast (technique described above).

## Results

Out of the 22 cases treated in *period I*, 5 cases received radiation alone (Group A), three of these died in one year and one after two years. One case, a lady doctor, who was treated in 1936 (age 35) for a tumour of the left breast responded favourably (the surgeon who referred the case preferred radiotherapy for the cosmetic effect). The tumour had shrunk after local irradiation but she complained of tingling 'nerve' pains in and around the region in the pre-menstrual period, and so in 1938 (age 37) I decided to irradiate her ovaries (gave her a sterilisation dose of x-rays to bring about an artificial menopause). She is doing perfectly well today and active—has no disturbances due to hormonal deficiency on account of the early artificial menopause brought about by x-rays. In one case (1936) which was considered 'inoperable' (group D), radiotherapy produced shrinkage

of the growth and three months after irradiation a radical mastectomy was done and the patient *survived six years*—no recurrence or metastasis

Of the 16 cases belonging to Groups C and E, 10 were dead within one year—most of these were with secondaries in bones or recurrences One survived for 5 years, 2 for 3 years and 2 for two years.

One other case is interesting—July 1936 radical mastectomy for cancer (Adenocarcinoma) of the left breast (age 36) followed by post-operative deep x-ray therapy, July 1937 radical mastectomy of the right breast for tumour (schirrous cancer), also followed by radiotherapy, no local recurrence In December 1939 she was admitted with pain all over the skeletal system, much emaciated and anaemic, x-rays revealed punched out areas of varying sizes all over the skeletal system (with the exception of the bones of the upper and lower limbs), characteristic of multiple myelomatosis; 'Bence-Jones—proteins' were present in the urine The skeletal system was irradiated with deep x-rays (details will be reported in another separate article) and the tumour defects in the bones disappeared and the trabecular structure of the bones involved returned to normal, blood picture returned to normal, patient gained weight, and was walking about in June 1940 She took ill early in December 1940, was brought to the clinic about the end of the month—x-rays showed no recurrence of bone lesions, liver was enlarged four fingers below costal margin, there was ascitis—the patient died in a couple of weeks—4½ years after the first operation

### Analysis

A total of 22 cases were treated during the period 1935 to 1938.

10 died within one year

3 died after one year

3 lived for two years

2 lived for three years

1 lived for four and half years—died of multiple myelomatosis

1 lived for five years

1 lived for six years

1 is alive for seven years—this is the only case alive in this series

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Total 22

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The results of the second series are given below . )

*Group A — 6 cases — radiation only*

No. of cases treated in the year				Alive and symptom free			
1939	1940	1941	1942	1 year	2 years	3 years	4 years
1 *	4 †	—	1	1	1	3	—

\* The one case treated in 1939 was anaemic, showed marked leucopenia indicating, I thought, involvement of bone marrow I anticipated early secondaries in the bones and the patient died within an year of bone metastasis.

† One case of the 1940 group died of heart failure 2 years later , there was no recurrence nor secondaries , the one case treated in 1942 is alive and well to-day

*Group B — 7 cases — local removal of tumour only + radiation*

No. of cases treated in year			Alive and symptom free.			
1940	1941	1942	1 year	2 years	3 years	4 years
1	2	3	3	1	1	—

Of the 1941 cases, one died within an year from meningitis , of the 1942, one was advanced recurrence and died within one year , all the other cases in this group are alive to-day

*Group C — 14 cases — radical mastectomy + post-operative radiation*

No of cases treated in year				Alive and symptom free.			
1939	1940	1941	1942	1 year	2 years	3 years	4 years
3	1	4	6	7 *	3	1	3

\* One of the 1941 group died of pleurisy after one year All other cases of this group are alive

*Group D — 3 cases — “ radiation for ‘ inoperables ’ followed by radical mastectomy ”*

1939 — 1 case lived for 2 years—died of influenza

1941 — 1 case died within one year of secondaries

1942 — 1 case—alive—no evidence of secondaries or recurrence

A total of 30 cases were treated during the period 1939 to 1942

4 died within one year

1 died after one year

2 died after two years.

11 are alive for one year  
 4       "       two years  
 5       "       three years  
 3       "       four years.

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Total 30

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23 out of 30 are alive at the time of report

### Discussion of Results

During the period 1935 to 1938 a large number of cases with recurrence or bone metastasis were encountered. None of these were subjected to post-operative radiation after radical mastectomy, and they came to the clinic for the first time with secondaries or recurrence. During the second period ending with 1942 this group was not so frequent. It is likely that the superior results are due to

- (1) thoroughness of operative technique
- (2) thoroughness of radiation technique
- (3) irradiation of the ovaries

It is to be remembered that the end results are better in an elderly woman nearer menopause as compared with a young person with actively functioning ovaries.

### General Table of cases treated with analysis of results

Year com- mencement of treatment	No of cases in Group					No dead within one year	Alive and symptom free						
	A	B	C	D	E		1 yr	2 yrs	3 yrs	4 yrs	5 yrs	6 yrs.	7 yrs.
1935			1		4	4					1		
1936	2		4	1	1	2	1	1	1	1		1	1
1937	2		1		2	3	1	1					
1938	1		2		2	1	1	1	1				
1939	1		3	1		1		1		3			
1940	4	1	1					1	5				
1941		2	4	1		2	1	4					
1942	1	4	6	1		1	11						
Total.	11	7	22	4	8	14	15	9	7	4	1	1	1

Table showing classification and survival period

Group	No of cases	Dead within one year	Alive and symptom free for						
			1 yr.	2 yrs	3 yrs.	4 yrs	5 yrs	6 yrs	7 yrs
A	11	2	3	2	3				1
B	7	2	3	1	1				
C	22	1	8	5	3	4	1		
D	4	1	1	1				1	
E	8	8							
Total	52	14	15	9	7	4	1	1	1

### Summary

An analysis of 52 cases treated for cancer of the breast is presented, radiation technique is described, irradiation of the ovaries is advocated in addition to routine post-operative irradiation.

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# THE SULPHONAMIDES IN SURGICAL PRACTICE

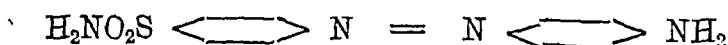
BY

J C DAVID, M B , PH D

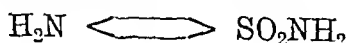
It is difficult to over estimate the way the sulphonamides have revolutionised medical and surgical treatment Chemo-therapeutic research has really undergone a renaissance , and really we cannot as yet predict the ultimate ramifications of these discoveries

As early as 1909 azo dye stuffs containing sulphonamides were synthesised in Germany Other azo dyes like pyridium, scarlet red and serenium had been put to medical use by 1930 But it fell to Domagk to make the epoch making discovery of the specific bactericidal properties of an azo dye (4' sulphonamido—2, 4 diamino azo benzene) in 1935 against systemic infections with streptococci In the following year Fournau showed that para-amino benzene sulphonamide was as effective and the finding of Bovet (1935) that prontosil was split at the azo linkage and yielded para-amino benzene sulphonamide was given added importance

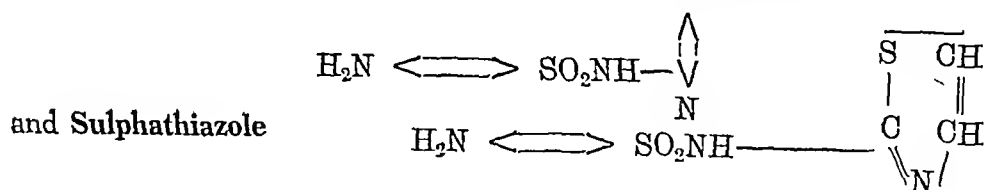
In the wake of these discoveries have followed the many derivatives now available for clinical use **Prontosil** has the following structural formula —



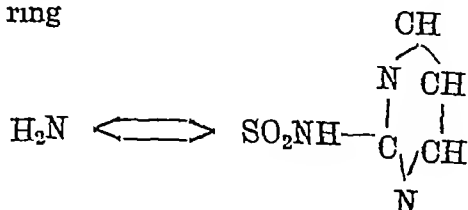
Being too insoluble for parenteral injection in solution, *Prontosil soluble* was then synthesised Here a substituted naphthalene ring takes the place of the amino benzene ring **Sulphanilamide** is written



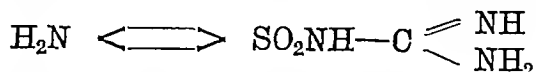
By substitution in the amido group we get **Sulphapyridine**



**Sulphadiazine** differs from sulphapyridine in having a pyrimidine ring instead of a pyridine ring

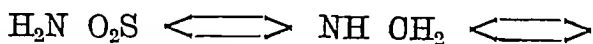


**Albucid** or Sulphacetamide has an acetyl radicle replacing one of the amido hydrogen. **Sulphanilyl guanidine**, a soluble product which is surprisingly absorbed only to a very small extent is written thus



and is used for the treatment of bacillary dysentery

**Proseptasine** or Benzyl sulphanilamide represents substitution in the amino group



**Soluseptasine** is similarly derived.

Of the above, only three need special notice. These are sulphanilamide, sulphapyridine and sulphathiazole. In general the action and uses of all these are similar. But there are some important points of difference. None of the three is soluble. Sulphanilamide is soluble to the extent of 1 in 125 (0.8 per cent). Sulphapyridine is only 1/30 as soluble, 0.15 per cent at body temperature. The solubility of sulphathiazole is 0.09 per cent. Sodium salts of the last two are soluble and are available for parenteral administration.

### Pharmacological Action

None of these derivatives has any important action on any organ or system of the body, besides the bactericidal action *in vivo*. It is true, however, that human beings manifest a number of untoward responses to therapeutic doses of sulphanilamide. These are manifestations of clinical toxicity and very often the result of individual idiosyncrasy, rarely of gross overdosage and misuse.

*The absorption and fate* of these compounds require special mention as the therapeutic effects depend on the concentration available in the blood and body fluids. Absorption is satisfactory by the oral route and the absorption of a single oral dose is complete from 3 to 5 hours. Even in the presence of diarrhoea, faecal excretion is negligible. Sulphapyridine is absorbed somewhat less rapidly. These compounds have been demonstrated in most physiological and pathological fluids in the body. Sulphathiazole does not seem to penetrate into the spinal fluid as readily as the other two. The height of the blood level depends on the doses administered and so by continuous administration of regularly spaced constant doses an equilibrium is reached within two to four days between intake and excretion of the drug. The blood concentration of these compounds is very important and no well conducted clinic should be without facilities for the estimation of the drug in the blood. The effects do not depend so much on the intake as the maintenance of effec-

tive blood concentrations which may be mentioned on the average as follows.

Sulphanilamide	10 — 15 mg	per 100 c c
Sulphapyridine	} 6 — 10 mg	per 100 c c
Sulphadiazine		
Sulphathiazole	3 — 5 mg	per 100 c c

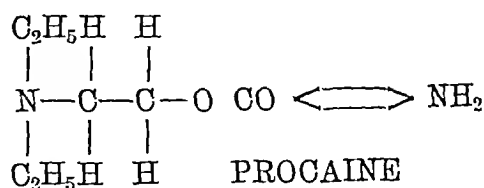
The drugs are excreted mainly in the urine, free and conjugated as the acetyl derivative, — 20 to 40% of sulphanilamide, 10 to 30% of sulphathiazole, and 50% of sulphapyridine. The acetyl derivative of sulphathiazole is the least soluble and may be a fruitful source of haematuria and calculus formation. Man excretes about 60% of sulphapyridine when taken by mouth as compared with approximately 95% of sulphanilamide and 70 to 80% of sulphathiazole. Water diuresis hastens excretion. The high excretion of sulphanilamide is of great practical value in the medication of urinary infections. For example, since approximately 90% of sulphanilamide is excreted in the urine, 4.5 grams per day will be excreted daily with a dose level of 5 grams. If the fluid intake is adjusted to allow a 24 hour urinary output of 1 litre (fluid intake of 1.5 litres per day) the concentration in the urine when equilibrium is established (after 3—4 days) will be 450 mg per cent. If we take it that half the amount is acetylated, the free form is 225 mg per cent. This is a high concentration and hence one can expect actual bactericidal effects in the urine with such doses. Sulphanilamide has the added advantage of being effective at all urinary pH's. Sulphanilamide, in some manner, causes the renal tubules, partially, to lose their ability to reabsorb fixed base and this leads to an alkaline reaction of the urine and an acidosis in some cases when it is uncompensated.

*The mode of action of sulphonamides*—These drugs exert a bacteriostatic, and in some instances a bactericidal action on micro-organisms, being specific against a number of virulent bacteria. *In vitro*, no action is seen on resting organisms but a definite retardation of growth takes place in culture media and in blood. In high concentrations, the organisms are killed. In the human body, there is no evidence to show that the natural immune processes, e.g., anti-body formation or phagocytosis are in any way stimulated by the action of these drugs. Most workers opine that "The action takes the form of an inhibition of the growth of the bacteria which brings about a suppression of their invasive power and which thereby permits the defence mechanism of the host to accomplish its function." Direct bactericidal effects are probably not produced by such therapeutic concentrations as are possible and recovery can, indeed, occur without complete eradication of the bacteria. In the urine, however, bactericidal concentrations are easily attainable, as already mentioned. The exact method by which the death of the

bacteria is brought about is as yet not definitely known. But Fildes (1940) postulated that the drug acted by interfering with an essential metabolite. An essential metabolite is a substance or chemical group which takes an essential part in a chain of synthesis necessary for bacterial growth. This essential metabolite, believed to be p-amino benzoic acid  $\text{HN}_2 \longleftrightarrow \text{COOH}$ , is normally associated with an enzyme and sulphanilamide, being structurally similar to it, is capable, if in sufficient concentration, of displacing p-aminobenzoic acid from its enzyme and stopping this essential line of metabolism. Such inhibition requires a substance so closely related in formula to the essential metabolite that it can fit the same enzyme, and sufficiently unrelated to be devoid of essential metabolic activity. It is a suggestive fact that synthesis of drugs along this line of research, has given us sulphapyridine where the pyridine ring is related to nicotinic acid, sulphadiazine, the pyrimidine ring of which is found in Vitamin B<sub>1</sub>, and sulphathiazole, the thiazole ring of which is also seen in Vitamin B<sub>1</sub>, these vitamins, we know, behave as co-enzymes in the body.

This concept of 'Substrate competition,' whereby sulphanilamide replaces an 'essential metabolite' in the enzyme system has assumed added importance in the light of recent researches. Woods (1940) investigating *in vitro* a number of substances chemically related to p-aminobenzoic acid, found that procaine and other derivatives of para-aminobenzoic acid were highly potent in this respect. He stated that procaine had about the same order of activity as p-aminobenzoic acid and that sulphanilamide could be neutralised by it. If this effect could be demonstrated *in vivo* this would certainly have a clinical application in infected cases under sulphanilamide therapy and requiring a local anaesthetic. Keltch *et al* (1941) showed that *in vitro*, while one molecule of p-aminobenzoic acid counteracted 200 to 500 molecules of sulphapyridine, one molecule of procaine counteracted 20 molecules. P-aminobenzoic acid was therefore 10 to 25 times as efficient in this respect as procaine. De Waal, Kanaar and Mcnaughton (1942) found that when injected into mice infected with

haemolytic streptococci, procaine had an *anti-sulphanilamide* action in cases where the maximum non-toxic dose of procaine was injected at short intervals. From Wood's figures it was calculated that the average amount of



procaine used in minor surgery should be sufficient to inhibit all the sulphanilamide in the body. Of course the inhibitory dose of procaine may vary from case to case according to the total amount of sulphanilamide, and of p-aminobenzoic acid in the body, derived from the infecting organisms and other sources. The persistence of the anti-sulphonamide action of procaine, no doubt, would depend upon the rate of its absorption, the rate of detoxica-

tion and excretion—the efficient functioning of the liver and the kidney being essential for this—, and the state of the local circulation and tissues—for example, oedematous and partially devitalised tissues would by tending to delay local removal of the drug leave a depot of procaine from which small amounts would be absorbed over a long period. The occasional large dose of procaine appears, for the most part, to have no lasting inhibitory action. De Waal and others therefore recommend that massive doses of procaine or a local anaesthetic derived from p-aminobenzoic acid should not be used in cases under sulphonamide therapy, especially early in the disease and more particularly in those cases not receiving intensive treatment. When a large amount of a local anaesthetic is required, one of those not allied to procaine may be used.

Local anaesthetics derived from p-aminobenzoic acid are procaine, benzocaine, orthocaine, larocaine, tutocaine, butyn.

The following local anaesthetics are neither derived from nor allied to p-aminobenzoic acid: cocaine, benzamine, stovaine, nupercaine, apothesine, metycaine.

**Principles of the use of Sulphonamides**—Whitby (1942) in a recent article has admirably summarised the principles to be kept in mind, in using these drugs. *The first principle is that the infecting organism must be sensitive to the drug employed.* The flora of a wound may also be so diverse that judicious selection may be required to get the best effects. While sulphanilamide, sulphapyridine and sulphathiazole, act specifically on *b-Hæmolytic streptococcus* and to a slightly lesser extent on *B. coli*, *B. pyocyaneus* and *Proteus vulgaris*, other organisms are not uniformly sensitive to these three drugs. Sulphathiazole acts best on the *staphylococcus*, sulphapyridine also being lethal to it, while sulphanilamide has little effect on this organism.

Of gas gangrene organisms, *Cl. welchii* is susceptible to all the three drugs, while *Vibrio septique* is not susceptible to sulphanilamide and none of these drugs act on *Cl. oedematiens*. In established infections with these, polyvalent gas-gangrene antitoxins should also be given. Indications for surgery are now quite different from what they were before sulphanilamide was available. Many cases in which in the old days the surgeon would have unhesitatingly advised amputation are now amenable to chemo-therapy and the surgeon would be well advised to give this a chance before radical surgery is undertaken.

*The second principle is to obtain and maintain an effective blood stream, spinal fluid, or local concentration.* It is essential that the administration should be four hourly, night and day, too often the night doses are omitted with the result that the concentration *in vivo* is reduced. These drugs

act best on small numbers of bacteria and therefore their free prophylactic use is essential in wounds which from their site, extent, or nature are an open invitation to gas gangrene infection

*The third principle involves the nature of the medium in which the drugs are called upon to act* Pus, is a substance which inhibits their action and it is therefore useless to expect the drugs either to disperse a collection of pus or to effectively act on a dirty and purulent wound

*A fourth principle is to avoid prolonging the medication indefinitely when no clinical evidence of effect is forthcoming* If adequate doses do not produce beneficial results in a week or so no good can come of further pushing the drug, obviously the organism concerned is insensitive. An early bacteriological examination in such cases is a useful check on useless chemotherapy. Conversely, too early omission of the drug, is apt to bring about relapse or even an exacerbation. Almost full doses should be continued for 2 days at least after the clinical effects have been produced

The *prophylactic value* of sulphonamides cannot be over emphasised. The object of chemotherapy in prophylaxis is first, to prolong the latent period before infection has become established until such time as proper surgical treatment can be obtained, and secondly, to ensure that any residual infection after debridement shall be eliminated

Colebrook (1941) rightly states "*By applying sulphanilamide drugs early the surgeon can hope to prevent many cases of gas gangrene, to prolong the safe period for debridement, to make delayed primary suture possible on many less severe wounds, to reduce the sepsis rate in compound fractures, to get healing in plaster without suppuration and to do much better with burns*" Every wound produced by violence is really a honey comb of spaces filled with serous fluid which acts as an excellent culture medium for pathogenic organisms. It is not possible for the surgeon to obliterate all these dead spaces, but sulphanilamide powder introduced into the wound can produce a nearly saturated solution for some hours. The drug travels from the central cavity of the wound down into the crevices, slowly penetrating into fragments of dead tissue lying in the wound and will reach the germs there, by local action it will not penetrate far into tissues with intact circulation, such tissues being reached more quickly and more effectively by systemic administration. Sulphanilamide is capable of producing a local concentration of up to 1500 mg per 100 c c but disappears more rapidly and is of lower bactericidal activity than others of this series. Sulphathiazole remains longer and is of greater bactericidal activity but the maximum concentration attained is only 180 mg per 100 c c. The diffusibility is also lower. Sulphapyridine produces even a lower concentration (60 mg per 100 c c) and persists in the wound so long as to act as a foreign body (Hawkins 1941)

Sulphanilamide has very low affinity for the tissues and serum proteins and so does not lose potency as the older antiseptics do. It is innocuous for fibroblasts and up to a strength of 1 in 400, it does not harm leucocytes.

Hawking (1941) recommends a mixture of sulphanilamide and sulphathiazole in the proportion of 2 to 1 for local application. Whitby (1942) advises the use of 5 to 15 g, according to the size of the wound, as a fine powder. However numerous the wounds, not more than 15 g should be used. It is also necessary to keep the wound moist with a saline gauze dressing or to cover the powdered wound with vaseline.

Sulphanilamide can be used for local application in the form of gauze impregnated with it or tablets or pastes. Hawking (1941) recommends tablets of 0.1 g sulphathiazole and 0.1 g glucose. Glucose encourages disintegration. The tablets can be sterilised by dry heat at 85°C for one hour. For routine ward work the powder can be used without sterilisation. Among many formulae for pastes given by Hawking the following seems to be easy of preparation. Sulphanilamide 30%, codliver oil 60%, beeswax 10%, with benzoin 0.5% to keep the paste from getting rancid.

With acute infections, both oral and local treatment are to be recommended. Oral dosage may be as much as 10 to 12 g daily for 7 to 10 days when there is a severe and extensive infection as with gas gangrene. But in early stages prophylactic treatment with 4 g as initial dose and subsequent administration of four hourly doses of 1.5 g for 4 to 6 days night and day has been advised. *Many die from too little sulphanilamide but none from too much.* These remarks apply with special force to war wounds.

Chemotherapy is the handmaid of surgery and must not be used to replace surgery. The indications for its use in acute *appendicitis*—and in other urgent abdominal conditions—must be properly understood. Cokkinis (1938) summarises his views as follows: “(a) sulphonamide therapy within the first 48 hours of an acute attack of *appendicitis* is unwise, as it may mask a dangerous complication or perhaps interfere with the first stages of immunity response, (b) on the other hand it is of real value as an adjunct to operation in the more advanced stage, when the appendix is perforated or necrosed, there is a purulent effusion in the peritoneal cavity, and the immunity response is presumably awakened, (c) the most striking results however have been obtained in late acute *appendicitis* with localised lump formation. Not only does the lump completely resolve and the patient becomes well, often in a few days, but the abscess formation and other complications are obviated, and appendicectomy may be safely performed after only a small fraction of the time one had to wait in pre-sulphonamide days.” In *acute general peritonitis*, chemotherapy may be of life saving value. Where there is a danger of general peritonitis following surgical

interference for appendicular abscess or perforation of the gut, local application of the sulphonamide powder can certainly prevent such a sequel and save life. It has also been proved beyond doubt that intraperitoneal medication with sulphanilamide causes an earlier maximum rise in the blood concentration than oral administration. For this purpose, the powder is sprinkled within the abdominal cavity over and surrounding the lesion. Sulphanilamide can stand dry sterilisation at 150°C. Usually one hour's exposure is sufficient. But since it is possible that in rare instances sporing micro-organisms may contaminate the powder, Long (1942) has instructed sterilisation in hot air oven at 145°C for 4 hours, which probably is taking greater precaution than ordinarily necessary. The US army is supplied with this powder in 5 g doses in a stout paper envelope containing an inner sterile one perforated with holes at one end for use as shaker. The holes are covered with a loose cellophane sleeve. B W & Co have now issued *sterilised sulphanilamide compound*, which is a free flowing mobile powder consisting of finely powdered sulphanilamide with 5% zinc oxide. The zinc oxide facilitates complete sterilisation without aggregation of sulphanilamide particles and also to retard absorption of the compound so as to prolong local chemotherapeutic action. Each bottle contains 15 g.

The uses to which chemotherapy can be put in surgical practice can be multiplied. The use of sulphanilamide in the treatment of *acute mastoiditis* following mastoidectomy is a rational procedure as extension of the infection will be prevented and the duration of the disease shortened. It is important to continue the drug in smaller doses after convalescence has been reached.

It is certainly worthwhile to make a careful therapeutic test with sulphanilamide in all patients suffering from *Chronic otitis media* and *mastoiditis* and this should be done regardless of the bacteria which may be isolated in cultures of the aural discharge.

The introduction of the use of sulphanilamide has revolutionised the treatment of *erysipelas*. The outstanding studies on the subject are those of Snodgrass, Anderson, etc (1938), the optimum dose being 1 g every 4 hours until cure is established, thereafter 1 g t d s for a further period of 14 days.

In the treatment of *empyema*, Long & Bliss (1939) are of the opinion that unless there is a pressing indication for surgical intervention, patients suffering from streptococcal empyema should receive intensive therapy with sulphanilamide in an attempt to clear the process without surgery. Paracentesis should be performed to remove accumulation of fluid.

*Pneumococcal infections* and *pneumonia* may often occur in the wake of surgical complaints. Chemotherapy has proved invaluable in such cases. Sulphathiazole and sulphapyridine are the drugs of choice—4 g followed by

1 g. every hour for four doses—then 1 g every four hours until temperature remains normal for 48 hours. In infections associated with Friedlander's pneumo bacillus, sulphadiazine is specific.

*Urinary infections* are largely amenable to chemotherapy, bactericidal effects being more readily obtainable in the urinary passages, for reasons already mentioned. Treatment should be persisted in for at least a week and should never be stopped the moment strangury, burning, and other symptoms disappear—for these symptoms which bring the patient to the doctor vanish with the first few doses. Sulphathiazole acts on *staphylococci* also and on *S faecalis*. The order of bacterial susceptibility to sulphathiazole in ascending order is *B pyocyaneus*, *S faecalis*, *E coli*, *B aerogenes*, *Proteus* and *staphylococcus aureus*. Strepto-faecalis is more readily killed by sulphathiazole in an acid than in alkaline urine at a pH of 5.5.

No account of the uses of these compounds can be complete without reference to the treatment of *Veneral Diseases*. *Climatic bubo* and *chancre* respond readily to treatment. Of great interest is the use of chemotherapy in the treatment of *gonorrhoea*. The earlier enthusiastic claims made of the absolute efficacy of this treatment have been modified in the light of experience gained during the past eight years. Rajam (1943) in his Curzon endowment lectures under the auspices of the University of Madras makes the following remarks—"Further experience and the passage of time and the enforcement of rigorous criteria of cure have sobered the earlier uncritical enthusiasm and brought to light certain disconcerting features of sulphanilamide therapy. The cure rate has gone down to a mere 30 to 40% and the rest 40% of apparent cures become asymptomatic carriers of gonococci - - - It is my rough estimate that one out of every three persons who have only satisfied the clinical criteria of cure, becomes an asymptomatic carrier and is sent into society to disseminate the infection and 1 out of every 20 persons who have satisfied the criteria clinically as well as bacteriologically will continue to be a carrier menace." With sulphanilamide therapy the difficulties of identifying the gonococcus have greatly increased as the treatment seems to change the morphology and the staining characteristics of the organism. Added to this, is the fact that chemotherapy leads to failure to obtain response with provocative agents. Culture and complement fixation tests, if properly carried out offer the only certain means of determining cure. Sometimes one comes across cases of gonorrhoea which are resistant to sulphanilamide but respond to sulphapyridine or sulphathiazole. Rarely one comes across a case quite resistant to all attempts at chemotherapy. Many workers believe that chemotherapy is more certain in its effects if begun after the natural immune processes have been set in motion. This is particularly so with sulphanilamide. With the other two drugs response is obtained even in the early stages of the disease. With

sulphanilamide massive treatment at least for three weeks *continuously* is necessary With sulphapyridine and sulphathiazole the duration of treatment is much less As sulphathiazole acts on staphylococci also it is particularly useful where secondary infection with staphylococci has occurred as in chronic gonorrhoea and post gonorrhoeal infective condition of the lower urinary tract

**Clinical Toxicity**—All authorities agree that a realisation of the possible toxic effects of these drugs, based on intelligence rather than fear, is demanded of physicians if a rational therapeutic use is to be made of these extremely useful compounds While the side effects are many, fatalities have been relatively few

Most patients receiving sulphanilamide experience mild toxic effects within the first 24 or 48 hours, specially in ambulatory cases Children and young adults tolerate the drug better than old and debilitated individuals The symptoms may be referable to any system in the body, the skin, bone marrow and blood being particularly affected

**Nervous system**—Headache is a very common symptom Dizziness and hallucinations have occurred in a good number of cases The symptoms may even resemble slight inebriation, and it is better, in ambulatory cases, to warn the patient not to drive a car or pilot an aeroplane Peripheral neuritis is fortunately not common Optic neuritis has been reported in one or two cases Coloring of the sclera has been seen in a few cases under *sulphathiazole* Many patients complain of an indefinite malaise which may be associated with anorexia, nausea and vomiting

**Cyanosis** has been given undue prominence It is only rarely encountered It does not cause respiratory or cardiac distress but may definitely reduce the 'ceiling' of air pilots It has been attributed to the formation of a coloured compound in the blood or the conversion of haemoglobin to methaemoglobin and sulphaemoglobin But the exact origin of the cyanosis is as yet undetermined It clears up rapidly on stopping the drug Methylene blue, *per os*, in six divided doses of a grain each in small children and  $1\frac{1}{4}$  gr at each dose for patients weighing more than 50 lbs will control the methaemoglobinaemia Because of the association of sulphur containing compounds and the production of sulphaemoglobin, it was originally considered advisable to taboo all sulphur containing food and even magnesium sulphate In as much as it has never been shown on an experimental basis that additional sulphur is bad for patients receiving sulphanamide, the custom of with-holding sulphur containing food is not insisted upon now

**Acidosis** may sometimes occur It has been already referred to Even if uncompensated it is mild and requires no special treatment other than making certain that there is a sufficient intake of sodium chloride "If this

is assured adequate renal function regulates the electrolyte pattern and the acid-base balance of the body" (Goodman & Gillman) The routine use of alkali is probably an added and unnecessary burden to a sick patient and it also neutralises gastric juice

*Blood*—Mild anaemia is not infrequent Acute haemolytic anaemia is a serious complication which may occur in the first week with a sudden onset Discontinuance of drug, forcing of fluids and blood transfusions are usually sufficient to cause recovery Toxic effects on white blood cells is a bug bear to clinicians, but the incidence is rare, only about 25 cases or so being so far reported Symptoms varying from leucopenia to granulocytopenia may occur Massive treatment for 3 weeks or more is usually necessary for such a sequel The first step to be taken is to provide for the rapid elimination of the drug Forced fluids, a diet rich in vitamin C and injection of nucleotide preparations are the measures available Once the complication has set in recovery is rare With sulphathiazole this complication has not been so far reported

*Skin eruptions* are much more common These may be angioneurotic and odematous, erysipeloid, erythematous, exfoliating, morbilliform, petechial, purpuric, scarlatiniform, or urticarial in type They may be transient or prolonged and severe No prodromal symptoms are noticed The temperature rises suddenly and drops to normal over a period of 2 to 4 days The rash is often associated with undue exposure to the sun With stoppage of drug the eruption fades rapidly The incidence is rarely more than 5% Some people are very sensitive and those who once developed it may again get it if the drug is repeated The skin eruptions are said to be somewhat more common after sulphathiazole

*Drug fever* is often accompanied by a rash, and may occur in 2 to 4% of the cases within the first week Any fever that cannot be explained during chemotherapy with the drugs must be ascribed to the drugs Forced fluid helps to excrete the drug

*Digestive system*—Nausea and vomiting occur invariably with sulphapyridine—rarely with the other derivatives and are probably due to a central action of the drug Acute toxic hepatitis with jaundice and decreased hepatic function may develop, fortunately rarely Forced fluid, abundant carbohydrates, restriction of fats, intravenous or subcutaneous administration of glucose and symptomatic therapy are indicated Hepatitis may be frequently associated with an exfoliating dermatitis

*Renal complications* are rare, acute nephritis being only a very uncommon complication Haematuria may occur as an important complication In the first stage it is microscopic and pain may be sometimes felt, in the second stage, the bleeding is gross and with pain, but clears up on forcing

fluid and withdrawing the drug. A more serious complication is impairment of renal function. Abundant fluid above 3000 c.c. per day *per os* and by injections, or 4-28% of  $\text{Na}_2\text{SO}_4$ , 10% glucose in normal saline may be given intravenously by the drip method. The cause is physical traumatization of the renal tissues by the less soluble acetyl derivative. This leads to calculus formation and haematuria. Sodium bicarbonate administered in large quantities keeps the acetyl derivative, especially of sulphathiazole, in solution and prevents local trauma (Clemanko *et al* 1941).

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# CALCULI IN THE FEMALE URETHRA—REPORT ON ONE CASE

BY

R N COOPER, M S (LOND), F R C S (ENG)—BOMBAY

Calculi in the female urethra are rare. Anatomically the straight and short normal female urethra does not offer any opportunity for impaction of a calculus. Such an impaction is likely to occur either at the external meatus, which is often the narrowest portion of the urethra, or in the body of a diverticulum. The aetiology of these diverticula of the female urethra will be considered later.

Urethral stones are either primary or secondary. A primary urethral calculus originates in the urethra. For such a stone to arise there must be either a congenital or an acquired diverticulum in the urethra in which some urine is retained. Stones resulting from stagnation of such retained urine, are mostly composed of Calcium and Magnesium phosphates and Carbonates. In some cases there is a nucleus of some foreign body inserted into the urethra such as a hair-pin or a bit of chewing gum (Cabot).

A secondary urethral calculus is either of renal or vesical origin and gets impacted in the urethra. After impaction it may grow by accretion of urinary deposits and may dig for itself a bed which looks like a diverticulum. It is indeed a matter of dispute whether a stone really forms in a pre-existing diverticulum or it gets impacted in the urethra and later creates a kind of a diverticulum. In the case reported, it could not be determined, either prior to or during the operation, whether there was a pre-existing diverticulum.

A urethral diverticulum is either true or false. A true diverticulum is a protrusion in which all the layers of the urethral wall are represented. Such a diverticulum is usually congenital.

A false diverticulum is a circumscribed dilatation in which the muscular layer shows a break in its continuity and the protrusion is lined by the mucosal and the sub-mucosal layers. False diverticula of this nature occur most commonly in women who have borne many children. In these cases an injury to the anterior vaginal wall may have damaged the urethral musculature. In other cases an inflammatory closure of the urethral gland ducts with resulting cyst formation and subsequent suppuration and rupture, may form the beginnings of a diverticulum.

The diagnosis of an impacted urethral calculus is fairly easy. The symptoms are those of obstruction and infection. Thus one may find painful, difficult and frequent micturition with pyuria or haematuria. There may be a purulent urethral discharge. Dribbling of urine may be found as

in the case reported. An impacted stone in the urethra can occasionally be seen by separating the lips of the external meatus. It can be palpated by a vaginal examination. A probe passed through the external meatus will hardly fail to reveal the presence of the stone.

The treatment of an impacted calculus is often of a two-fold nature—the extraction of the calculus and the repair of the diverticulum—

It is possible to extract a stone after dilating the urethral orifice, injecting some sterile liquid paraffin and employing an alligator type of forceps for gripping the stone. In other cases it would be a wise policy to push the stone back into the bladder and deal with it by litholapexy. Forceful attempts at extraction through the urethral orifice has led to incontinence necessitating a plastic repair.

Where the stone is very large and irregular in shape and enclosed in a diverticulum the approach should be through the vagina. An incision over the calculus through the vaginal wall will easily dislodge it. An attempt should be made at the same time to excise the diverticulum and reconstruct the urethra over a catheter introduced through the external meatus into the bladder. Because of existing infection healing may be difficult. It is for this reason that Shivers and Cooney recommend a supra-pubic cystostomy and drainage for about three weeks.

### **Report of a Case of impacted Calculus in a female urethra**

Case No P/7931. A Hindu female, multipara, aged 22 years was transferred from the Wadia Maternity Hospital to the K.E.M. Hospital, Parel, Bombay, on 20-8-42. She was six months pregnant and she had sought relief for dribbling of urine. There was no previous history of passing gravel. No colic of any kind was complained of. She had experienced difficulty in passing urine for the last 15 days only. The difficulty increased and culminated in constant dribbling.

Pain of a moderate degree was complained of in the hypogastrium and in the urethra during micturition. Diurnal frequency of urination was three or four times and nocturnal frequency once or twice before dribbling set in. She was positive that the stream of urine was uninterrupted before the onset of dribbling.

There was a definite purulent discharge from the urethra. A large sized calculus could be palpated by a finger in the vagina. A probe passed through the external meatus also identified it. A skiagram showed a large calculus in the urethra. Except for a large number of pus cells, a few red blood cells and a fair amount of albumen, the urine did not present any other abnormality.

Previous to operation pyelopurin was administered by the intravenous route.

On 22-8-42 patient was operated on under intravenous anaesthesia employing sodium pentothal.

The patient was placed in the lithotomy position.

As extraction of the stone by an alligator forceps was not feasible, an incision was made directly on the body of the stone from the vaginal aspect and the stone

extracted with lithotomy forceps. The incision was closed with catgut sutures in two layers. A catheter was introduced through the external meatus into the bladder and allowed to remain there. After twenty-four hours the catheter slipped out and was re-introduced. On the third day the catheter came away again but was not re-introduced. On the ninth day the patient was passing urine normally having made an uneventful recovery.

The stone weighed 18 grammes. It was a little irregular in shape and measured 2.7 X 2.5 X 2.5 centimetres in its three diameters.

The Pathological Department of the Hospital reported that the Calculus was composed of fibrin, magnesium and calcium phosphates and traces of uric acid. There was no evidence of the presence of a foreign body.

A careful history revealed that the woman had remarkably few symptoms before she sought admission. The paucity of symptoms and the composition of the stone suggest that the calculus originated in the urethra. As already stated it could not be determined whether the stone or the diverticulum was the primary lesion.

Shivers and Cooney reported an instance of a large calculus in a urethral diverticulum and collected 22 case histories of stones in the female urethra. Of these a foreign body formed the nucleus in 3 cases. In all other cases where a foreign body did not form the nucleus, evidence pointed to the stone forming higher up and migrating to the urethra. In this group there were two exceptions. From these case reports they conclude that only in 3 cases a calculus had formed primarily in a diverticulum. This included their own case.

Hinman records a case of a calculus in the urethra about 10 cm in diameter. He had to do an external urethrotomy for its removal.

Keyes quotes Babes who records the spontaneous expulsion through the female urethra of a stone 3 X 4.5 X 6.5 cm weighing 76 grammes. She was left with incontinence.

### Summary

- (1) Stones in the female urethra are rare
- (2) Modern views about this condition are stated
- (3) One case report of an impacted Calculus in the female urethra is included
- (4) Literature on this subject is briefly reviewed

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# FRACTURE DISLOCATIONS OF SPINE

BY

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Dislocation of the spine can occur only in the cervical region easily as the articular surfaces are more or less horizontal, but, in the other parts of the spine these articular processes are almost vertical so that a dislocation cannot occur without the bones giving way. Such fracture-dislocations are usually due to indirect violence caused by forcible flexion and sometimes by hyper-extension of the spine. These occur in such a way in the cervical and dorsal regions usually, in the latter case being sometimes accompanied by fracture of the sternum.

When the fracture is complete the continuity of the whole spine is broken with fractures of one or more vertebrae together with a slipping of the whole spinal column above it. The injury is usually known as fracture-dislocation. A pure complete dislocation occasionally seen in the cervical region is clinically indistinguishable from the above condition. A fracture-dislocation may occur in any part of the spine but is most common in the dorsal or dorsi-lumbar region being specially frequent in the neighbourhood of the fourth dorsal vertebra.

The fracture-dislocation occurs at the point where the flexion is most acute. The damage is usually extensive there being a complete bilateral dislocation of the articular processes which are usually fractured as well, while the ligaments are torn and the bodies of one or two vertebrae are fractured in a direction which runs obliquely downwards and forwards. Thus, the upper half of the spine slides downwards and forwards upon the bodies of the lower part. Impaction may be present while in some instances the spinous and transverse processes will be fractured. The spinal cord is crushed between the arch of the vertebra above the fracture and the posterior edge of the vertebral body which is fractured. The membranes are occasionally pierced by splinters of bone while haemorrhage will occur within or outside them. The most important point in the diagnosis is the investigation of the state of the nervous system which shows signs and symptoms of a total transverse lesion of the cord, specially if the site of the fracture-dislocation is the upper dorsal-region, because, here, the cord fills the neural canal and its mobility is restricted by the nerve roots and the ligamenta denticulata. In the lumbar region the lumen of the spinal canal is wide and the nerves of the cauda equina are relatively mobile. Displacement, even of gross degree, may cause no more than simple nerve compression.

Recovery from paraplegia in fracture-dislocation below the first lumbar level may be anticipated in at least two-thirds of the cases after reduction and immobilisation

Lumbar fracture-dislocations with locking of the articular processes deserve special mention for, if the spine is hyper-extended without first unlocking the processes, recovery from paraplegia is practically impossible because nerve injury is increased by attenuation. Such cases require operative reduction resulting in complete recovery

In the lower half of the dorsal spine the cord injury may be less severe and a few cases have recovered after postural reduction of the dislocation. The more severe degrees of primary bony displacement in the cervical spine may be masked by complete spontaneous reduction and the cord may be irrecoverably damaged without any X-ray evidence of bone injury. Ascending haemorrhage and oedema may rapidly lead to a fatal result. In some cases recovery is possible after manipulative reduction or by skeletal traction and cord injury is less severe in such cases.

### Case Report

An albino male child aged six years was admitted with a history of retention of urine and faeces and paresis of the lower limbs following injury to the spine. While



Fig 15 Fracture Dislocation of the 2nd lumbar



Fig 16, In plaster after reduction



Fig 17 Spinal Column after reduction

playing he fell down on his back getting his spine hyper-extended due to the impact of a stone lying on the ground striking against the lumbar region of the spine

On examination there was a depression in the upper portion of the lumbar region below the prominence of the first lumbar spine showing a definite discontinuity in the spinal column. Nervous system Examination showed paresis in the lower limbs with no loss of sensation. All reflexes were present though sluggish. Plantar reflex was flexor.

He had retention of urine for a day only and bowels had to be evacuated by an enema.

X-ray report of the lumbar spine (lateral view) (Fig 15)—Fracture dislocation of the 2nd lumbar vertebra which is displaced forward along with the lumbar spine. The lumbar vertebral body is lying just in front of the first lumbar body.

Under general anaesthesia the spine was extended by manual traction from either end followed by pressure upon the upper segment of the spine forwards. The spine was kept as much flexed as was possible and an X-ray was taken in the lateral view. The latter showed reduction of the dislocation to a great extent (Fig 16). The spine was flexed further and after the maximum amount of reduction was obtained a plaster of paris jacket was applied enclosing the whole thoracic and lumbar spine. The patient was X-rayed again in plaster after two days when the spinal dislocation was found in the reduced condition as the skiagram shows (Fig 17).

There was no aggravation of the injury to the cauda equina, as occasionally occurs during attempts at reduction. The patient complained only of slight radiating pains along the lower limbs. The patient was able to move his thighs and legs as before and could even stand. There was no retention of urine or faeces. He was discharged and was asked to report after three months with instructions to exercise the muscles of the lower limbs every day.

The peculiarity of the case reported is the occurrence of the dislocation of the lumbar spine in front of the upper dorsal segment which is very rare. Usually the upper segment goes in front of the lower due to acute flexion of the spine. Here the patient fell down with the spine in the position of hyper extension upon the brick which pressed the lumbar spine in front of the upper dorsal, to such an extent as to cause superimposition of the second lumbar vertebra over the first. The effect upon the fibres of the cauda equina can well be realised and they must have got acutely kinked causing only paresis of the lower limbs and retention of urine for a day only. One surprising fact is the ease with which the dislocation could be reduced under general anaesthesia by extension followed by flexion of the spine. The articular processes must have been fractured to give rise to such a condition, and they did not obstruct the easy reduction.

The spine had to be immobilised in the position of slight flexion by plaster jacket to prevent redislocation. The limbs could be moved except

for very slight weakness Almost complete return of motor power is expected

The period of immobilisation will have to be sufficiently long, i.e., about four to six months to ensure the stabilisation of the spine and to preclude any chances of recurrence of the dislocation

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**ANNUAL MEETING** It has been decided, after consultation with the members of the Governing Body, to postpone the Annual Meeting which was proposed to be held at Hyderabad in February, 1943. The date of the next meeting will be decided later

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## SUBJECTS FOR DISCUSSION

### 5th Meeting

1 Laryngeal Carcinoma by Dr H D Gandhi and Dr S G Joshi, Bombay

2 Injuries of the Thorax by Dr C S Patel, Bombay

3 Surgery of the Gall Bladder by Dr P Chatterjee, Calcutta

### 6th Meeting

1 Traumatic Surgery of the Skull by Dr R N Cooper, Bombay

2 Carcinoma of the Breast by Dr N C Joshie, Delhi

3 Urinary Lithiasis by Dr L B Joshi, Karachi

### 7th Meeting

1 Carcinoma of the Rectum by Dr C P V Menon, Madras

2 Enlarged Prostate by Dr S R Moolgavkar, Bombay

3 Fractures of the neck of the Femur by Dr B N Sinha, Lucknow

### 8th Meeting

1 Carcinoma of the Cheek by Dr B M Joly, Delhi

2 Tuberculous disease of the Spine by Dr S P Srivastava, Agra

3 Hare Lip and Cleft Palate by Dr S C Sinha, Calcutta

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# THE INDIAN JOURNAL OF SURGERY

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## PARACENTESIS ABDOMINIS

(Vagbhata)

सजले जठरे तैलैरभ्यक्तस्यानिलापहैः ।  
स्निग्धस्योष्णावुं नाकक्षमुदरे परिवेष्टिते ॥ ११३ ॥  
वद्धछिद्रोदितस्थाने विध्येदंगुलिमात्रकम् ।  
निधाय तस्मिन्नाढीं च स्नावयेदर्धमंभसः ॥ ११४ ॥  
अथास्य नाडीमाकृष्य तैलेन लवणेन च ।  
त्रणमभ्यज्य वध्वा च वेष्टये द्वाससोदरम् ॥ ११५ ॥  
तृतोयेहि चतुर्थे वा यावदाषोडशं दिनम् ।  
तस्य विश्रम्य विश्रम्य स्नावयेदल्पशो जलम् ॥ ११६ ॥  
विवेष्टयेद्गाढतरं जठरं च श्लथं श्लथम् ॥

ASHTANGA HRIDAYA CHIKITSA STHANA  
Chapter, XV

*A free translation of the above may be rendered thus —*

When the abdomen is tight with fluid inside, the patient should be given a vapour bath, after anointing with a suitable medicated oil (soothing to the nerves) and a binder applied covering the area from the axilla to the hip. An incision, about an inch in length, is put in the same place as indicated in cases of intestinal obstruction, (described in the last issue of the journal) and a tube (a description of this tube is given in another chapter along with instructions for the make of other instruments—द्विद्वारा नलिका पिच्छनलिका बोदकोदरे—a tube open at both ends or a peacock's quill) inserted through it. About half of the fluid is slowly drawn out and the tube withdrawn. The wound is dressed with oil and salt and the abdomen bandaged. The procedure is repeated on the third or fourth day and in 16 days the whole of the fluid is tapped out little by little, with intervals of rest. As the abdomen becomes more and more relaxed the binder should be proportionately tightened.

# ACUTE OBSTRUCTIVE APPENDICITIS

BY

S R JOGLEKAR, FRCS (ENG & EDIN),

BOMBAY

*Five consecutive cases in medical students, illustrating the obstructive lesion*

In cases of acute appendicitis, the question when to operate always looms large. In the last century, when appendicitis as an entity was almost unknown—these cases being called Typhlitis or Perityphlitis—it is quite easy to believe that mortality must have been heavy. Even when this condition was described by Sir Frederick Treves in England, opinion as regards treatment was divided. Surgeons advised operation and Physicians, as a rule recommended medical treatment. It was, however, soon realised that purely medical treatment was disastrous and the tendency to earlier operation and removal of the appendix gained popularity. This in its turn, led to operation and removal of the appendix whenever the condition was diagnosed, irrespective of the consideration whether the attack was subsiding or not, whether there were adhesions and abscess formation or not, or whether there was general peritonitis or not. Operation fatalities increased and then Ochsner in America and James Sherren in England suggested and carried out what is well known to-day as the Ochsner-Sherren treatment. This method proved very successful in many cases and there was again a swing back to non-operative methods. In certain cases the results were bad and then it was that Sir David Wilkie pointed attention to a particular type of Appendix lesion, obstruction of its lumen, and clearly showed the danger of treating such cases by the Sherren method. He advised operation as soon as the condition was diagnosed, and so early operation was again advocated by many surgeons. Even then there were many unsatisfactory and bad results. These results made Sir James Berry write to the Medical Journals, expressing strong disapproval of Appendicectomy operations in the early stages and he cited two cases, the first one of the late King Edward VII on whom Sir Frederick Treves operated under the guidance of Lord Lister, when the appendix was not removed, but only an abscess was drained, and the Royal patient survived, and as a contrast he pointed out the case of the late President Eberth of Germany, when the appendix was removed on the fourth day of the disease and the patient died. And so the discussion went on and is going on even to-day about early and late operation in acute appendicitis.

To my mind, the chief difficulty is because it is not clearly recognised by many surgeons that there are two types of appendicitis, mechanical or obstructive and inflammatory. The two conditions require different lines of

treatment The first variety needs immediate operation and in the second type, especially in late stages, the least possible interference as regards surgery is indicated If Treves had operated on President Eberth, and the surgeon who operated on the President of Germany had operated on the King of England, the results may possibly have been just the reverse, as one would have done the least possible interference and the other would have removed the appendix at any cost If in late stages of an inflammatory lesion, the protective barriers are broken into, as a result of attempts to remove the appendix, the results are likely to be disappointing

Sir David Wilkie has shown the differences in the clinical course of the two varieties of appendix lesions He points out strongly, that the term acute appendicitis is a misnomer in the obstructive type, in as much as it is not inflammation at all, but a variety of intestinal obstruction, more serious because it is of the closed loop variety If neglected in the early stages, this obstruction may go on to inflammation, perforation or gangrene, thus merging with the inflammatory lesion in the later stages In Wilkie's opinion, if the term appendicitis must be retained, the name given should be mechanical appendicitis as opposed to inflammatory appendicitis This distinction should be made quite clear in all our text books and those of us who are teachers in medical schools, should impress the distinction very strongly on the minds of all our students

The classical teaching of Murphy about the clinical findings or symptom-sequence in acute appendicitis still holds true to-day He describes this as follows —(i) Generalised pain in abdomen vaguely located round the umbilicus, (ii) Nausea or vomiting, (iii) Rigidity and tenderness in the appendix region usually the right iliac fossa, (iv) Fever and (v) Leucocytosis, the last two only in the inflammatory type or when inflammation supervenes in the obstructive cases

The differences in the symptoms in the two types are as follows.—

OBSTRUCTIVE	INFLAMMATORY
<ol style="list-style-type: none"> <li>1 Pain is more severe and is colicky in nature</li> <li>2 These colicky attacks come on at intervals and patient is restless and may roll about during the attack as in other colics In between attacks patient may lie quiet in bed</li> <li>3 Nausea and vomiting are marked and persistent</li> <li>4 Rigidity and marked tenderness in appendix region during attacks</li> </ol>	<ol style="list-style-type: none"> <li>1 Pain not so severe, dull continuous in nature</li> <li>2 Pain may become gradually less on resting, and patient lies quiet in bed with legs drawn up as in other peritoneal inflammations</li> <li>3 After the initial nausea or vomit, there may be no more of it in later stages unless peritonitis supervenes</li> <li>4 Rigidity and moderate tenderness in early stages</li> </ol>

5	Temperature and pulse rate may be normal or pulse rate even slower between attacks During attacks pulse rate rises	5	There is rise of temperature and slight rise of pulse rate after about 12 hours
6	Leucocytosis absent unless inflammation supervenes	6	Leucocytosis present after 12 or 18 hours

As regards treatment, I have observed the following rules and I have been satisfied with the results. If there is a reasonable certainty of the diagnosis of obstructive or mechanical appendicitis, early and almost immediate operation is advised. In the inflammatory type, if a purgative is given before the case is seen, early operation is done. This rule is almost absolute in children under 10 years of age. In other cases, the severity of the attack and the duration of the illness, determine whether an operation is done immediately or not. If the decision is against early operation, strict Ochsner-Sherren treatment is instituted, which means nothing—not even water—is given by mouth and certainly no mixtures or medicines. Fluids and glucose are given by the rectal or intravenous route. Moynihan has classified appendicitis deaths into two classes, apart of course from cases where the patients have come to the surgeon too late. He calls these deaths, (A) Purgative deaths in which perforative peritonitis occurs as a result of mistaken administration of a purge, and (B) Operation deaths, in which by meddlesome surgery, attempts are made to remove an inflamed appendix, in late cases, by going beyond the defensive wall of omental adhesions. I would add a third cause of death to these two and that is (C) Delay in operating on cases which are obviously of the obstructive or mechanical type. All these causes of death can certainly be avoided.

Another point which I think should certainly be remembered is that in most cases of acute appendicitis, whether mechanical or inflammatory, the appendix is usually tense and friable and an adequately long and suitable incision and very gentle and careful handling are essential. Any extra time required in carefully delivering the appendix out of the wound is well worth spent. Two, out of the many apt sayings of Moynihan may be quoted here.

A One eye on the clock and another in the abdomen is bad surgery.

B All good surgeons are usually quick, but all quick surgeons are not necessarily good.

The question of a suitable incision is very important in many of these cases. I prefer a McBurney incision suitably modified according to the particular case except where the appendix is of the pelvic type, as determined by the tenderness and rigidity, when a right paramedian paraumbilical incision is more practicable.

In conclusion I would like to emphasize two general rules. (I) Early operation in frank obstructive cases where the condition is really one of

closed loop acute intestinal obstruction and (II) In late cases of inflammatory lesions, to do as little as possible in the way of operative treatment, except to deal with complications such as abscess formation or perforation if and when these arise. I believe that the Surgery of acute appendicitis is bound to gain in value if these rules are closely followed.

I am appending a full report of five consecutive cases of obstructive appendicitis in students of the Grant Medical College, and I think these reports clearly show the value and necessity of early operation in these cases.

#### CASE 1

Admitted —24-8-1941, at 8 A.M.

Operation —24-8-1941, at 2 P.M.

Discharged —27-9-1941

Name —S. J. A.

Age —20

Past history —No history of previous attacks

Present illness —Slight pain started at 7 A.M. on 23-8-1941. Patient had his usual breakfast, but pain persisted. It was colicky and all over abdomen, increasing in severity, but bearable till 4 P.M. At 7 P.M. an enema was given with good result, but no appreciable effect on the pain. A vomit at 7-30 P.M. brought out the food taken in the afternoon. At 9 P.M. the pain which was till then generalised became localised to the right lumbar and iliac regions, shooting down towards the rectum. The temperature was normal throughout and pulse rate between 72 and 90 per minute. The patient had a restless night, and vomiting was frequent and persistent. The temperature began to rise from 1-30 A.M. on 24-8-1941 and at 4-30 A.M. was  $101^{\circ}\text{F}$ . There was no abdominal rigidity during the night. At 7 A.M. patient passed a small stool. Pain, restlessness, and nausea continued and I first saw the patient at 8 A.M. on 24-8-1941. At that time the temperature was  $100^{\circ}\text{F}$ , pulse rate 100 and respirations 36. Vague tenderness in the lower abdomen and marked tenderness on the right side per rectum was present. Pulse rose to 106 and nausea persisted, and operation was decided upon and performed at about 2 P.M.

Operation findings —McBurney incision slightly lower than usual was taken. Gangrenous perforated appendix, with obstruction near base and free pus in iliac fossa and pelvis were found. Appendix was removed and pus wiped away. 20 c.c. of solutaseptasine were put in the pelvic cavity. The wound was closed with drainage. Post-operative intravenous glucose-saline, 3 pints per day was given. Progress was satisfactory for seven days, but afterwards there was a setback due to severe colicky pains and after a somewhat stormy convalescence, the patient recovered completely in about two months' time.

#### CASE 2

Admitted —11-9-1941, at 9 A.M.

Operation —12-9-1941, at 10 A.M.

Discharged —22-9-1941

Name —A. J. W.

Age —21

Past history —No previous attacks,

Present illness.—Colicky pains from 4-30 A.M. on 11-9-1941 Generalised all over abdomen Bowels moved once and vomited twice On admission, temperature 97°F, pulse 60, respirations 24 Rigidity in right iliac fossa and tenderness No lump could be felt The pain subsided completely in the afternoon But started again the next morning, with nausea Operation was decided upon and performed at 10 A.M. on 12-9-1941

Operation findings —Through a McBurney incision, a tense and distended appendix, normal in colour, but with complete obstruction by a faecolith near the base, was removed and wound was closed completely Convalescence was smooth and uneventful

### CASE 3

Admitted —28-11-1941, at 9 A.M.

Operation —28-11-1941, at 5 P.M.

Discharged —14-12-1941

Name —J M D

Age —24

Past history —Pain in abdomen for one year, repeated on and off Pain used to radiate to right testis No fever in previous attacks

Present illness —Pain started at 8 P.M. on 27-11-1941 Nausea, but no vomiting On admission at 9 A.M. on 28-11-1941, temperature was 101°F, pulse 112, respirations 28 Rigidity, tenderness and marked hyperaesthesia in right iliac fossa No lump felt At 4-30 P.M., temperature was 100 4°F, pulse 120, respirations 26

Operation findings —McBurney incision Appendix red, turgid and thick, with faecolith inside About an ounce of seropus round it Appendicectomy done No drainage Convalescence uneventful, except for slight distension on second and third day

### CASE 4

Admitted —17-1-1942, at 2-45 A.M.

Operation —17-1-1942, at 3 P.M.

Discharged —31-1-1942

Name —L T D

Age —25

Past history —Five previous attacks relieved by enemata Full course of Emetine Hydrochloride in one previous attack as stools showed Entamoeba Histolytica cysts No fever in previous attacks

Present illness —Pain colicky in nature started at 5 P.M. on 16-1-1942 One vomit Pain localised in subumbilical region right side about midnight On admission, temperature 97°F, pulse 80, respirations 28 Fullness in right iliac fossa, but no lump Slight rigidity No hyperaesthesia Tenderness in right ischio-rectal region on rectal examination. An Enema was given and patient kept under observation. Temperature rose to 99 6°F at 8 A.M. and 101 2°F at 12 noon Pulse rate at 8 A.M. was 96 and 12 noon, it was 124

Operation findings —Right paramedian incision. Appendix was pelvic in position, with commencing gangrene and obstruction by faecolith, present There was some free sero-purulent fluid around the appendix, which was removed and the pelvis mopped

up Wound closed without drainage Convalescence was uneventful except for saline rigor on day of operation

### CASE 5

Admitted —21-1-1942, at 10 A.M. to the Medical wards Transferred to the Surgical side at 11 A.M. on 25-1-1942

Operation —25-1-1942 at 3 P.M.

Discharged —2-3-1942

Name —M K

Age —25

Past history —No history of previous attacks

Present illness —Pain started suddenly on 23-1-1942 in the early morning Generalised at first, but localised to right side on 24-1-1942 Patient passed six semi-solid stools, but there was no blood or mucus in the faeces Persistent nausea was present but no vomiting On admission to the medical wards, temperature was 97.5°F, pulse 72, respirations 26 Abdomen moved on respiration No fullness or lump anywhere There was rigidity and tenderness in lower abdomen Rovsing's sign present Slight generalised distension of abdomen On rectal examination marked tenderness and fullness on anterior wall of rectum above prostate On 25-1-1942 at 6 A.M. temperature was 100.2°F, pulse 118, respirations 30 Patient was transferred to the surgical side at 11 A.M. and operation was performed at 3 P.M.

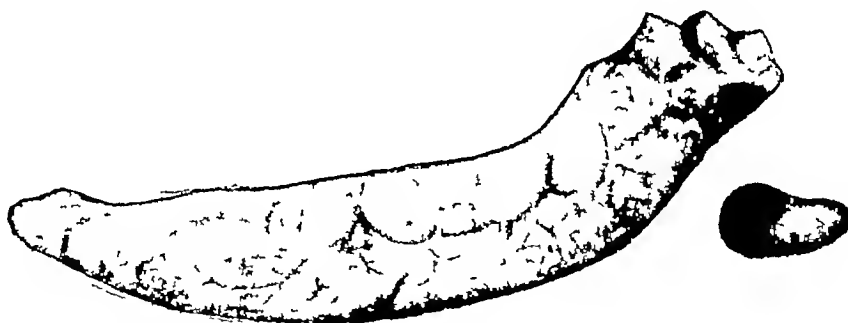


Fig 1 Appendix and Faecolith (Actual size) From case No 5 M K.

Painting by Mrs S R J

Operation findings —Muscle splitting incision lower abdomen on right side near midline Free purulent fluid escaped on opening peritoneum Coil of ilium presented itself showing frank peritonitis (Flakes of lymph on surface) Caecum and appendix were identified carefully, and the latter was found frankly gangrenous, with a large faecolith, 1 cm in diameter, obstructing the base (Fig 1) Appendix was removed with great difficulty 20 cc soluseptasine and 2 grms of powdered sulphanilamide were put in the peritoneal cavity A cigarette drain upto base of appendix was introduced, and wound closed

Post-operative period —Patient had obstinate retention of urine and a catheter had to be tied in Three pints intravenous glucose-saline were given daily and also by the rectal drip Distension was very troublesome Temperature and pulse rate remained higher than normal for six days, but dropped down to 98°F, and 80, on the seventh day Convalescence was slow, but patient was discharged cured on 2-3-1942

# DEATH ON THE TABLE\*

BY

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AND

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Death is a disaster to the patient and his relations and for all practical purposes there is little difference whether it happens on the table or on the bed. But to the surgeon and the anaesthetist a death on the table has a significance very different to that on the bed

The misery and ignominy through which they have to pass are appreciated only by those who had the misfortune to have met with such an accident. Apart from the pangs caused by the thought of being instrumental or actually causing the death of a person who might have lived without their interference they have to face a coroner and his jury who are not always fitted by training and experience to sit on judgment on the cause of death during operations under anaesthesia

Not unoften undue prominence and publicity is given in the press from which the lay public, unaware of the actual circumstances in which the death occurred, draws erroneous conclusions. They doubt not only our competence to undertake such responsibilities but actually suspect the safety of surgical operations

The story of such a death is always coloured as it passes from one person to another. They remember it for the rest of their lives and dissuade the suffering patients from very necessary operations by striking terror by the harrowing tales of death on the table of a remote past

These are the far-reaching and pernicious effects of a death on the table

Death on the table is not so rare as one thinks. I have knowledge of at least eighteen deaths during the last twenty years in about twenty thousand operations, i.e., 0.9 per thousand operations. As my experience is mostly limited to the teaching and better equipped hospitals the figure is comparatively low. I think the mortality rate will be appreciably higher if a larger number of operations from various smaller hospitals and those of the mofussil are included

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\*A paper read at a meeting of the Calcutta branch of the Indian Medical Association, May, 1943

In England the death rate during operations under anaesthesia is pretty high and is thought to be higher than what it was some years ago

The more recent statistics show a mortality rate somewhere between 1.4 to 1.8 per thousand<sup>1</sup> whereas the Anaesthetic Committee of the British Medical Association found it to be 1.25 per thousand over twenty years ago under chloroform, ether and gas and ether<sup>2</sup>

Compared to the usually accepted figure of 1 in 2000 under the most dangerous chloroform and an American figure<sup>3</sup> of 1 in 5000 cases under chloroform and ether the recent British figure is disconcertingly high

These findings and particularly the recent admission by Bailey<sup>4</sup> that he has been having an average of two primary cardiac failures in a year for the last twenty years in his own practice alone have produced real concern. Even averaging a thousand operations per year on a liberal estimate the figure is fearfully high—one in every 500 operations.

There has been much discussion regarding the causes of such a high incidence of mortality on the table. Some think that the teaching in anaesthesia is defective while others are suspecting the indiscriminate use or safety of the newer drugs in anaesthesia and the various more recent machines.

Regarding immediate operative fatality in Calcutta at least I am inclined to think it is more favourable than what it was twenty years ago.

It is rather strange that whenever a death occurs during an operation under anaesthesia the laity and even many in our profession ascribe the death to anaesthesia. It is possible that the idea has its origin in the fact that death occurs on so many occasions under anaesthesia even before the operation is begun. Such an idea is, however, quite erroneous and death on the table may be due to either the operation or the anaesthesia or both, acting as contributory factors on a patient who is already moribund and is being given a last chance.

#### THE CAUSES OF DEATH ON THE TABLE

I propose to discuss the causes of death on the table under the following three heads. My reference to death due to operations as distinct from that due to anaesthesia will be brief and I leave it for more competent persons.

- A Deaths essentially due to the Surgical condition for which the patient seeks relief, the operation acting as a contributory factor as in patients in extremis and are mostly acute abdomens, injuries, gas gangrene, etc

**B. Those in which the Principal Factor is the operation as in**

- 1 Severe SHOCK producing operations
- 2 Profuse unavoidable or accidental HAEMORRHAGE
- 3 INTERFERENCE WITH THE FUNCTIONS OF THE VITAL PARTS as in
  - (i) Sudden decompression in cerebellar tumours
  - (ii) Collapse of the trachea during removal of big goitres
  - (iii) Sudden bursting of an abscess or hydatid cyst of the lung or rapid drainage of pus from a bronchiectatic cavity the patient being drowned in his own pus The same accident may happen after opening a retro-pharyngeal abscess

(I know of a liver abscess which was meant for operation the next morning but burst into the lungs during the night and killed the patient by asphyxiation The anaesthetist escaped)

- (iv) EMBOLISM—blood clot, fat, air

**C Deaths associated with anaesthesia**

- |                           |   |
|---------------------------|---|
| 1 Asphyxia                | 8 Careless administration of a Wrong drug |
| 2 Overdose                | 9 Ether Convulsions                       |
| 3 Primary Cardiac Failure | 10 Sudden Acute Dilatation of the Heart   |
| 4 Spinal Analgesia        | 11 Rupture of Cerebral Vessels            |
| 5 Local Infiltration      | 12 Massive Atelectasis                    |
| 6 Barbiturates            | 13 Status Lymphaticus                     |
| 7 Rectal Avertin and      | 14 Explosions                             |

**Death due to Anaesthesia**

The two commonest causes of death due to anaesthesia are ASPHYXIA or OXYGEN-STARVATION with added anaesthetic (Secondary Cardiac Failure) and OVERDOSE

Oxygen-starvation may occur from

- 1 Mechanical obstruction by
  - (i) Falling back of the tongue
  - (ii) Clenched jaws with obstructed nasal passages

- (iii) Falling back of the epiglottis
  - (iv) Mucus
  - (v) Blood clot
  - (vi) Vomited material
  - (vii) Loose or False teeth
  - (viii) Foreign body, *viz*, gauze pack, cotton wool, etc
- 2 Too much cutting down of oxygen in closed methods as in gas work
  - 3 Deficient oxygen carrying capacity of the blood with low haemoglobin as in anaemias.

The *most important essentials* in the prevention of death due to this factor lie in the elimination of the causes producing it, recognition of the early signs of oxygen-lack and correcting it at the very onset

Once allowed to be fully developed it may be too late to save the patient and that possibly after some anxious struggling with the patients jaw during which some damage is done in the way of breaking a tooth, tearing the lips, injury of the tongue or a tracheotomy

*What are we to eliminate to prevent mechanical obstruction?* Among the causes of mechanical obstruction there are at least two which can be avoided with only a little care and require no skill or experience whatsoever. They are the oft-repeated food and false or loose teeth before an anaesthetic. The instructions regarding their avoidance are so antidiluvian that it may appear ridiculous to mention them, yet considering how frequently some of these very elementary instructions are observed only in their breach either from ignorance of the real significance of such omissions or from lack of care and the many anxious periods that I have had to save patients from impending disaster simply due to the neglect of these apparently unimportant rituals an apology is really not called for in my repeating them.

In an operation under an anaesthetic, the anaesthetist and the surgeon are already taking many risks unavoidably associated with most operations and all anaesthetics and there can be no excuse if some one increases the risk-factors due to his ignorance of the most elementary essentials or lack of a little care

**Food before operation.** No solid food should be given—and milk is solid from our point of view—within at least six hours of an operation under an anaesthetic. Even six hours are not always enough especially in patients who are conscious that an operation is going to be done within a few hours.

It is well known that during such anxious states, the emptying of the stomach is delayed and food has been found even eight hours after its intake

Rigid instructions regarding avoidance of food before an anaesthetic especially in children and in minor operations should be given preferably in writing. It is in these instances that care and thought are least bestowed. The guardians should be made to understand the risk associated with food during anaesthesia. Because even when such instructions are given only on paper along with other orders, *viz.*, enema at 6 a.m., frequent gargling, etc., they attach equal importance to all the orders not realising that the neglect of an enema may be only messy at its worst whereas food before an anaesthetic may be actually fatal.

But when the lay relations see their wards actually vomiting under an anaesthetic and turning blue from asphyxia they get terribly frightened and would invariably confess that they never realised that vomiting during anaesthesia could be so dreadful.

I cannot forget a scene I witnessed in a private house at the end of an anaesthetic for a circumcision on a boy of about ten years. Food was given by the old grandfather three hours before the anaesthetic. During recovery the child vomited undigested solid food material and got badly asphyxiated with clenched jaw and rigorous respiratory efforts through partially obstructed larynx which gave us some anxiety. After there was peace on the table there was some storm a little beyond. The father and the grandfather of the boy both thoroughly scared and shaken were violently accusing each other for allowing food. The grandfather now saying that the son should have stopped the meal as he was too old to anticipate such horrible consequences. And this very gentleman thought I was unnecessarily fastidious while I was hesitating to give the anaesthetic so early after a meal.

Not unoften the ladies of the house load their favourites with some food without the knowledge of the male members lest the few hours' starvation before the operation weaken their fragile dear one too much to stand the strain of the operation. On many occasions I have found the child vomiting recently taken food the male relations wondering till the query from the "Zenana" cleared the mystery.

Apart from causing death from asphyxia by vomited material an overloaded stomach may cause death by hampering cardiac action and myocardial failure especially if the heart is already damaged—a recognised mode of death on the table not often realised.

It should be remembered that food before an anaesthetic may not only cause anxiety and fatality on the table but it is the cause of many trouble-

some and sometimes fatal lung complications afterwards due to aspiration of debris leading to multiple atelectasis with superimposed infection.

To illustrate the real danger from food material two cases are cited—one that escaped with tracheotomy in my own practice and another that died in spite of tracheotomy

#### CASE No 1

Child, aged three years—angioma forehead During anaesthesia under open ether in the late second stage the child suddenly started sucking in the lower costal margin and no respiratory sounds could be heard All attempts to correct the airway failed and the child was getting asphyxiated The Surgeon who was still getting ready was quickly sent for to do a tracheotomy With the opening of the trachea the child gave the usual cough and out came something through the mouth which on examination was found to be the skin of a grape about  $\frac{1}{2}'' \times \frac{1}{2}''$  On putting the finger over the opening of the tracheotomy tube the child was found to breath quite comfortably now The ward nurse informed us that the child was given grapes by the parents the previous evening

#### CASE No II<sup>5</sup>

Henry, an eight year old boy had been given five anaesthetics during the year by the same anaesthetist for surgery of an osteomyelitis of the femur He was about well and came at three o'clock for his last cast change "Nothing since eight this morning" was the mother's reply to the food question

The induction was with ethylchloride and during the change to ether Henry started retching and in about 30 seconds, with cyanosis fairly well developed vomited bread and jam Before the mouth could be well cleared he took a deep inspiration The diaphragm and thoracic muscles were struggling with increasing violence but no more air was entering the lungs The pharynx was quickly explored with the finger and found to be clear By this time a tracheotomy was started and completed within a minute Henry's colour was black. No air passed through the tracheotomy opening and the cyanosis changed from black to gray The Surgeon fished with a haemostat through the tracheotomy opening in an attempt to dislodge the obstructing material but failed. Henry's respiration ceased and shortly thereafter while the Surgeon was still frantically fishing he died. Necropsy revealed a piece of ham about four inches long and half an inch wide at the bifurcation of the trachea tightly plugging both main bronchi The mother did not know anything about it Had Henry been asked he would have possibly told about it and a disaster could have been avoided

**Loose or False teeth**—have been the cause of death on the table and impaction in difficult situations It is surprising how frequently patients with false teeth in position are sent unconscious under a basal narcotic to the anaesthetic room even in hospitals where the ward sisters and nurses have definite instructions regarding their removal prior to sending them for operation

It is also rare to find a patient from whom the loose teeth have been extracted even though on many occasions the teeth are so loose that they come out during anchoring

To avoid the dangers associated with loose or false teeth an anaesthetist should always do well not only to ask the patient if he has loose or false teeth but he should actually see it for himself and in suspicious cases or while the patient is unconscious under a basal narcotic run his finger over the teeth to estimate its degree of mobility to enable him to decide whether it requires removal or anchoring

Just before an operation or anaesthetic it is not always enough to ask the patient whether he has false or loose teeth because there are some who during such a period are absent-minded or dazed under the effects of morphine or byoscine and cannot give the right answer though apparently looking quite sensible. In fact I had many occasions where even an educated adult male having loose or false teeth has answered in the negative while asked whether he had any of them.

Sometimes they say so intentionally as they are afraid that the loose teeth may be extracted without their consent—a peculiar attraction which some people have for their loose and positively harmful teeth with which they do not want to part

Again children may be too nervous at the time to tell you correctly about their teeth. Curiously I have met more than one medical student and doctor who have plainly hinted at the superfluity of my query about loose teeth in children, momentarily forgetting such a natural phenomenon as second dentition but suddenly came to their senses with a feeling of shame while reminded of it

False teeth should be always taken out unless permanently fixed but it is always wise and convenient to leave loose teeth efficiently anchored to strands of silk firstly because extraction produces a certain amount of bleeding inside the mouth which is not desirable before an anaesthetic from the point of view of pulmonary complications and secondly, which is none-the-less important to save ourself from designing persons who may drag you to court for uprooting his strong and useful teeth during careless gagging under anaesthesia. Moreover while they are not under a basal narcotic they always object to have their teeth extracted as has been already mentioned

**Blood during mouth operations** is another danger the magnitude of which is not always fully realised. It may collect above the larynx and necessitate a tracheotomy, I had such an experience in a cleft palate operation on a child of about four years. The child was gradually getting cyanosed and at the same time there were gradually diminishing respiratory sounds with increasing efforts of the diaphragm and other muscles of respiration till no air intake occurred at all. A tracheotomy had to be done and with the violent expulsive cough that occurs with the opening of the trachea a longish

firm blood clot was expelled. It is possible that part of the clot might have been lodged below the larynx in the trachea. The operation was completed without any further incident.

Sometimes the blood may trickle through the larynx and collect lower down in the trachea as low as its bifurcation. In one instance a child died within a few minutes of the removal of tonsils and adenoids. The death was attributed to shock and anaesthetic. Post mortem revealed a complete cast of the trachea and main bronchi.<sup>6</sup>

Apart from this danger on the table particles of blood are the causes of serious post-operative pulmonary complications including lung abscess resulting in prolonged convalescence or even death.

The risks from this cause is best eliminated by intratracheal anaesthesia the pharyngeal plug around the intratracheal tube preventing entry of blood below. Apart from this supreme advantage to the patient the peace and comfort accruing from this sense of security which the surgeon and the anaesthetist enjoy during operation under intratracheal technique are best appreciated by those who have had occasion to work within the mouth with the ordinary methods of anaesthesia.

**Falling back of the epiglottis** though a less common cause of mechanical obstruction has not been given due importance in most books on anaesthesia. It is not often diagnosed and when all the usual methods of restitution of the airway fails one is compelled to do a tracheotomy. Possibly failure to recognise this condition is the reason why in some of the older books on anaesthesia a knife and a tracheotomy tube have been included in the anaesthetist's armamentarium. I met with a few cases during anaesthesia of long duration with pure chloroform. It can be corrected by lifting up the epiglottis with a finger hooked round behind it or by an angular tongue depressor.

**To prevent and combat mechanical asphyxia** the anaesthetist must be competent in the use of airways, nasal tubes and intratracheal methods. Airways and nasal tubes must be put in at the appropriate time. Otherwise they give more trouble than peace. A good working knowledge of these will prevent the anaesthetist using the two undesirable instruments—the gag and the tongue forceps except rarely.

**Mechanical Obstruction** especially when it is complete and in the lighter planes is usually diagnosed without difficulty and even before the signs of oxygen-starvation manifests itself. But oxygen-starvation from lesser degrees of obstruction while slowly progressing and under conditions as in 2 and 3 (Page 13) were not so easily recognised. The signs indicative of such a condition are cyanosis, increased rate of breathing with or without

increase in the amplitude of the respiratory excursions and development of the Brace syndrome—increased pulse rate and variation in the volume of individual beats. But in fact the anaesthetist depends most on cyanosis as his guide for the estimation of the degree of oxygen-starvation.

Recognition of early cyanosis is therefore imperative to avoid dangers on the table. In fair skinned people cyanosis becomes evident early at its onset but in most people of the coloured races its recognition is not so easy as it appears. The nails and the inner side of the lips appear to be the best guides. It is surprising that even these places are sometimes peculiarly dusky which masks cyanosis. The surgeon can draw one's attention from the colour of the blood which is not always visible to the anaesthetist. The artificial lights do not show slight cyanosis and the coloured walls and glasses of many private houses give an appearance of cyanosis while there is none or sometimes the reverse.

Again it has to be remembered that OXYGEN-WANT THOUGH IT USUALLY PRODUCES CYANOSIS, DOES NOT ALWAYS DO SO, and in fact a patient may die of oxygen-lack and yet there may not be any cyanosis as in some cases of anaemias with low haemoglobin percentage in the blood.

Conversely a patient with high haemoglobin content may be cyanosed but safe and not suffering from a dangerous degree of oxygen-starvation.

This apparent anomaly is explained by the fact that to produce cyanosis there must be at least 5 gms of reduced haemoglobin per 100 c c of blood. With lesser amounts of reduced haemoglobin a cyanotic colour cannot be produced. Now if a patient has 33% of haemoglobin, i.e., 5 gms in 100 c c (the normal being 15 gms in 100 c c)—however much he may be starved of oxygen he will not get cyanosed as the whole of his haemoglobin cannot remain in a reduced state. In fact it is known that even with 40% haemoglobin a patient may die of oxygen-want and yet he may not be cyanosed—a fact of supreme practical importance and not always realised while operating on anaemic subjects. It is worth while remembering that a cyanosis even with 60% haemoglobin indicates a dangerous degree of oxygen-lack and should not be allowed.

On the other hand a patient who has 17–18 gms of haemoglobin per 100 c c of blood can afford to have 5 gms of his haemoglobin reduced in every 100 c c of blood and appear cyanotic with enough haemoglobin still left (12–13 gms per 100 c c) to prevent oxygen-want which is unsafe.

This is why in suitable cases some degree of cyanosis is permissible in nitrous oxide anaesthesia though the idea is gaining ground that cyanosis in any circumstances is not ideal and should not be recommended.

Whatever may be the justification for allowing some degree of cyanosis in people with 100% of haemoglobin we in Bengal cannot afford to allow cyanosis in our patients except on rare occasions. Here it is not often that we find a haemoglobin of above 70% only especially in the hospital class and therefore any cyanosis in such subjects is indication of an undesirable degree of oxygen-starvation and should always be guarded against.

In the majority of accidents from oxygen-want the anaesthetist is responsible. Either he has failed to maintain a free airway, or he has missed a progressively developing cyanosis or he is ignorant or unobservant of the signs of oxygen-want in the absence of cyanosis.

### Overdose

Overdose forms a fair percentage of deaths due to anaesthesia whatever may be the view of some to the contrary. In fact overdose and asphyxia together take the largest toll during anaesthesia.

Because the signs of overdose come gradually and there is enough warning to cut down the anaesthetics it is true that death from this cause is not likely with the experienced, but with chloroform having a small safety margin, the less experienced may fatally overdose his patient as he is not always sure of the depth of narcosis to which he has gone.

There is another factor in chloroform, which is not always realised. Asphyxial element manifests itself by increased amplitude of respiratory excursions so long as the respiratory centre is not depressed—a state of things usual with anaesthetics like Nitrous oxide and Ether. But with chloroform which is a respiratory depressant a gradual obstruction to air entry may pass unnoticed in a long operation because of the absence of increased respiratory excursions. If the patient is dark coloured or there are other factors which obscure cyanosis the less experienced may be prevented from remedying the obstruction. The defective lung ventilation due to depressed breathing and mechanical obstruction leads to deficient elimination of chloroform leading to overdose and respiratory arrest which may appear sudden.

In the prevention of overdose the anaesthetist should do well to remember that during maintenance, the amount of anaesthetic required to keep the patient at a certain depth becomes less and less with the duration of anaesthesia.

At the same time one cannot impress too much the importance of avoiding anoxaemia. A degree of concentration of the drug in the blood which might not have been lethal becomes so in the presence of oxygen-lack,

### Primary Cardiac Failure due to Ventricular Fibrillation or Vagus Inhibition

Primary cardiac failure is the most dangerous of all the causes of deaths on the table because it comes with a dramatic suddenness apparently from no cause, gives no premonitions and hardly gives time for institution of remedial measures. Either it passes off in a minute or death results.

It is the most tragic because it occurs more frequently in the healthy young when the physiological activity is at its maximum and early in anaesthesia when the unwary beginner least expects such a catastrophe.

**Recognition of Primary Cardiac Failure**—During the early stages of anaesthesia but may be during the later stages also, *the pulse suddenly stops, the colour becomes pale and the respiration ceases* almost instantaneously after one or two deep breaths, *the pupils are dilated*. If the resuscitation measures are going to be of any avail the condition should be diagnosed at the very moment of its onset. This can only be done if the anaesthetist constantly remembers the real danger of sudden cardiac failure especially during chloroform anaesthesia and always keeps an eye over the pulse—it can always be done from the facial or superficial temporal if the radial is not available. If the pulse is not being watched, in fair skinned people a sudden change of colour leads one to the pulse at once.

**Frequency**—It is impossible to estimate its frequency. Hewer<sup>7</sup> thinks that it does not occur more frequently than 1 in 20,000 cases in the practice of the skilled. At the same time Bailey<sup>4</sup> reports of his having done forty cardiac massages for primary failure during his twenty years of practice, *i.e.*, once every six months. I had the misfortune to see one very bad case almost beyond recovery and certainly two others, *i.e.*, three only during the last twenty three years in my own practice. I had been a spectator in a case where this accident happened before the operation was begun and two surgeons were on the point of opening the abdomen when the pulse returned to the relief of all. The patient was a strong athlete, a muscle dancer and a medical student.

I think if chloroform or a mixture containing it is used this catastrophe happens more frequently than what Hewer suggests, at the same time it should not be so frequent as forty times during a period of twenty years of a Surgeon's practice unless there is something grossly wrong somewhere. All the three cases of my own and the one which happened in my presence had chloroform or chloroform-ether in sequence. Bailey's cases also had chloroform in some mixtures.

At the same time one is bound to accept that with care vigilance and experience the condition can be prevented or even if it occurs it can be combated successfully in most cases if diagnosed in time. Otherwise how can

we explain the fact that in their early few years some anaesthetists lose a few cases but during the later twenty or thirty years they meet with no fatality even though they have to do larger numbers of more serious cases as years roll by

#### The factors favouring its onset

- (i) Fear and excitement before operation
- (ii) Struggling
- (iii) Breath holding and anoxaemia during induction
- (iv) Prolonged induction
- (v) Intermittent administration
- (vi) Variation in the concentration of the vapour
- (vii) Any stimulus during light anaesthesia such as the trauma
  - of the operation, sudden movements as in lifting of the patient with jerks, noises, even the delirium of the second stage and preliminary preparation of the operation area on the table
- (viii) Introduction of adrenalin by injection or surface application particularly if chloroform is being used

#### Its occurrence depends upon three factors

- (i) Increased sympathetic activity with
- (ii) Consequent liberation of adrenalin
- (iii) Irritability of the cardiac muscle

**Mechanism**—The fear and excitement of an impending operation stimulates the sympathetic to increased *output of adrenalin*

Administration of *chloroform* possibly with struggling, breath holding and anoxaemia increases cardiac irritability. The "stage is thus set" and any *stimulus* mentioned above may bring on the unsynchronised fibrillary movements of the cardiac muscle

**Death** in ventricular fibrillation is due to oxygen-starvation of the cardiac musculature. It results from lack of blood-flow through the coronaries from failure of co-ordinated contraction of the heart muscle

The resumption of the cardiac rhythm will depend on the amount of the oxygen reserve the heart muscle possesses at the moment of the accident. If the reserve is not consumed during the period the fibrillation lasts, the heart contracts again and that immediately, but if the reserve oxygen is unduly exhausted the depression of the cardiac muscle will be too much to allow the heart to restart its rhythm.

Herein lies one among many other *reasons for avoiding oxygen-lack* and of constantly supplying as much oxygen as possible by maintaining a free airway particularly during chloroform administration. A heart with a greater reserve of oxygen might stand a minute's fibrillation whereas another with a lesser reserve is sure to give way.

**Frequency with various anaesthetics**—It occurs most frequently with *chloroform* or some *mixture containing it*. But it must be considered a potential danger in every form of anaesthesia. It has been seen in *novocaine* infiltration and is said to occur also in *special analgesia*. Chloroform of course is the greatest offender, *ethyl-chloride* ranks next.

**Vagus Inhibition** is another cause of primary cardiac failure. Whether the sudden cardiac failure is caused more frequently by fibrillation or hyperactivity of the Vagus has not yet been decided. But from the practical point of view it may be stated that both the conditions are produced and favoured under identical conditions.

The causes, signs, prognosis, and measures adopted for the prevention and resuscitation are practically the same whether the failure is due to ventricular fibrillation or cardiac inhibition from heightened vagus activity. As a preventive measure injection of atropine prior to administration of anaesthesia has been advocated as its administration has been found to prevent this phenomena at least in the laboratory animals.

**Prevention** lies mainly in avoiding the factors that produce it.

- 1 Avoid chloroform or any mixture containing it
- 2 An adequate dose of atropine at least fortyfive minutes before an anaesthetic
- 3 Keep patient in an atmosphere free from fear and away from the operation theatre before an anaesthetic and operation. Fear as a cause of death has been long known and death before operation in pre-anaesthetic days was not rare. By previously informing them that they would be killed by bleeding, criminals, condemned to death have actually died from fear only. Their eyes were bandaged and doctors after making incisions over the elbow kept on telling them loudly the imaginary increasing rate and progressively deteriorating nature of the pulse, and the rising amount of blood that was supposed to be collecting.

A tramway inspector fell dead from the shock of seeing one tram-car running backwards and crashing into a car following " 8

"A boy of nine years died from the fright of being run into a perambulator on a dark night " 8

Such instances may be multiplied

The common prevalent tendency of taking lightly every case of fright before an operation should be condemned. Appropriate measures should always be taken to reduce fear-factor to the minimum especially in children. A basal narcotic is a great advantage and whenever necessary and possible it should be given. Barbiturates may afford some special protection against sudden syncope. In the early days of Basal narcosis we had to send away a Jewish gentleman of thirty with an inguinal hernia twice from the anaesthetic room because of the morbid dread he exhibited from the time of his arrival inspite of a preliminary dose of morphine—hyocine—atropine. The third time we took no chance and gave him a rectal paraldehyde in the ward without informing him of the date of his operation and the operation was performed. The next morning he expressed his gratefulness in no uncertain terms.

- 4 During induction avoid breath holding
- 5 Rapidly carry through the second stage—as this is the most dangerous period
- 6 Maintain an even concentration and avoid intermittent administration.
- 7 Increase vapour strength gradually
- 8 Permit no cyanosis
- 9 Prevent sudden lifting of the patient
- 10 Inflict no surgical trauma before the patient is properly under the effects of the anaesthetic
- 11 Avoid adrenalin—injection or surface application

**Treatment**—If the usual methods, viz, cessation of the anaesthetic and the operation, trendelenburg position, clear airway, artificial respiration, carbondioxide-oxygen or pure oxygen, hot towels over the precordium and dilatation of the anal sphincter fail —

*Puncture Auricle* through the third right interspace with a long needle. Injection of drugs through the needle is not essential, as recent researches tend to show that it is the stimulus of the puncture which is the important factor in initiating the rythm, and auricles are more sensitive than the ventricles. The drugs that have been injected are camphor, coramine, dextrose, stropanthine, etc. The apparently hopeless case that I met in my practice (loc cit) was resuscitated by acupuncture only.<sup>9</sup> The sudden cardiac arrest occurred during separation of the lymph varices from the cord

in a young man of twenty during the administration of pure ether in a chloroform-ether sequence. He underwent a similar operation on the other side a few weeks ago by the same surgeon and the same anaesthetist under the same sequence type of anaesthesia without incident.

An efficient instrument has been devised in America by which a needle electrode starts the sinus impulse and acts as an artificial pace-maker.

*Cardiac massage*—If immediate response is not obtained with cardiac puncture the heart should be massaged without delay.

In infants and young children it may be done without opening the abdomen by one hand below the costal arch and another over the precordium. But in adults the abdomen has to be opened and the heart massaged Subdiaphragmatically or Transdiaphragmatically. To be of permanent benefit the circulation must be made to start within five minutes of cardiac arrest though there is a case on record where complete recovery occurred after at least thirteen minutes had elapsed before the massage was started.<sup>10</sup>

During all this time artificial respiration must continue. If after establishment of the circulation the respirations do not start it has to be continued preferably by Sylvester's method or by an iron-lung if one is available. Administration of CO<sub>2</sub> and O<sub>2</sub> must be carried on.

Cardiac massage failing cardiac puncture should be tried if this has not been already done as is not unlikely in an abdominal operation—success has been reported by such procedure.

Hamilton Bailey got 10% success in his forty cases of cardiac massage. *Intraarterial Perfusion* of 0.023% of calcium chloride in normal saline with 1 c.c. of 1 in 1000 adrenalin chloride into the brachial or carotid with the funnel at 6½ feet above the cardiac level for sufficient intracoronary pressure has been tried as a last resort.<sup>11</sup>

### Spinal Analgesia

It is responsible for quite a percentage of mortality on the table. I have knowledge of four deaths in three of which death occurred unexpectedly before the operation was started. In two of them death happened within a few minutes only and in the third the patient died within a couple of hours but he turned so bad immediately after the injection that the operation could not be begun. The fourth case died during an abdominal while he was also having accessory inhalation ether because of unsatisfactory relaxation. The four deaths happened in a number of spinals totalling not more than five hundred on a very generous estimate.

Death is caused by the drugs reaching the vital centres through the cerebrospinal fluid in sufficient concentration to paralyse them or by medullary anaemia from extreme fall of blood pressure by paralysis of the sympathetic vasomotor fibres in the anterior roots or by exhaustion of the respiratory centre from anoxaemia due to phrenic and intercostal paralysis with secondary cardiac failure

The two agents in preventing and combating the extreme fall of blood pressure are ephedrine before the spinal injection and the Trendelenburg position. But it must not be forgotten that head-down position is dangerous during the first few minutes of a spinal injection with a heavy solution

In actual failure similar treatment to that in general anaesthesia must be undertaken. A cylinder of oxygen or  $\text{CO}_2\text{-O}_2$  mixture must be at hand before any spinal injection, as also respiratory and circulatory stimulants

### Local Analgesia

Some fatalities have happened from local analgesics especially cocaine and its derivatives and also from percaïne. Death may be caused by *overdose*, *inadvertant injection into a vein* and *idiosyncrasy*

**Overdose** produces pallor, sense of tightness over the chest, dilated pupils, difficulty in breathing, excitement, rapid and feeble pulse, tremor, convulsions, unconsciousness and death

In my practice I had a female patient of about twentyfive years who developed generalised tremor, dilated pupils and unconsciousness after an injection of about three ounces of a two per cent solution of novocaine without adrenalin around her breast. The pulse though rapid had good tension and volume and therefore no remedial measures were adopted. The operation of excision was completed with the patient still unconscious, she recovered after about three hours

I am aware of a case where death occurred in an Indian male of about thirtyfive years after infiltration with pantocaine solution for the operation of herniotomy. Subsequent examination proved that the solution was twenty times stronger than the usual dilution used in that hospital

With a two per cent solution the lethal dose is about twelve grams, i.e., little less than one ounce and a half of the solution whereas almost double the amount was injected in the case mentioned without fatality. This was probably due to the fact that the breast including a fair amount of the solution was removed very quickly which prevented absorption of the whole of the solution,

In this connection it may be remembered that the toxicity of local analgesics is in geometrical ratio to their concentration. Therefore a certain maximum weight of a drug may be injected in a dilute solution while the same total amount or even less of the drug will be toxic in a less dilute solution. Thus a 5% solution of novocaine may be injected up to 500 c.c. (i.e. about 33 grms.) though as already mentioned, in a 2% solution only about twelve grams should be injected (i.e. about 40 c.c.). Again the intravenous lethal dose is one-tenth the subcutaneous dose.

**Injection into a vein** by accident may produce the same toxic effects and even sudden death especially if injected in a high concentration. It is thought that this sudden death may be due to ventricular fibrillation as in chloroform.

Adrenalin which is often added to the novocaine solution increases the liability to ventricular fibrillation.

**Idiosyncrasy** to cocaine and its derivatives are well known and cases of death are reported now and then from even surface application of cocaine in rhinological work. I am cognisant of a case of fatality in a boy in his teens who died within a few minutes after the nose was plugged with a cocaine plug.

A second case—a strong European male had a narrow shave after an injection of about 10 c.c. of a 1% solution of novocaine for an operation on a small sebaceous cyst over his shoulder.

A third case to my knowledge was a professor and a doctor of medicine who also had a narrow escape after about 5 c.c. of a 1% solution of novocaine injected for an operation for piles. It is possible that some solution might have found its way into a vein. He was pale with imperceptible radial pulse and was complaining of a sense of tightness around his chest and a feeling of impending dissolution before he turned unconscious. The usual remedial measures brought him round on the table but the operation had to be postponed. It was done after a few days under gas-oxygen.

### Barbiturates

The recent introduction of intravenous barbiturates has added another factor in causing immediate mortality. I have knowledge of only one case which died under Sodium Evipan while a cellulitis of the hand was being operated upon single-handed.

Up to the present these drugs have been often used with much indiscretion without due regard to its contra-indications, complications and limitations. It has been found being administered by the operator single-handed with the patient in the head up position, without knowledge of the blood

pressure and proper appreciation of the hepatic condition and without being equipped with a single appliance required for resuscitation. One must always be prepared for any emergency during an intravenous anaesthesia just as in inhalation anaesthesia and there must be someone competent to manage the airway during and after the injection.

They cause death by severe *respiratory* or *circulatory* depression, mechanical *asphyxia* from unattended relaxed jaw, adductor spasm or clenched jaws in the presence of insufficient nasal bore. Idiosyncrasy to Evipan or Pentothal has been seen and therefore safety-pause is very important during injection.

To prevent accidents three points should be rigidly obeyed. They are *slow injection*—1 c c every fifteen seconds, *safety pause* of one minute after first 3 c c and *clear air-way*.

For *respiratory* and *circulatory* depression *artificial respiration*, inhalation of *carbon-dioxide oxygen* or *pure oxygen* and *intravenous coramine* or *cardiazol* should be given. *Intra cardiac injections* of these drugs may be necessary in cases of complete cardiac arrest. Repeated *lumbar puncture* has been recommended as this is the only route by which some drug which is excreted into the cerebrospinal fluid may be withdrawn.

### Rectal Avertin and Paraldehyde

Deaths on the table have been caused by these drugs which are mostly attributable to **Overdose** and **Idiosyncrasy**. I met with a case where six drachms of paraldehyde were given by mistake to a patient, six stones in weight with pyonephrosis. Even though the injection was given to the wrong man the dose was not bigger than the dose recommended. But the man became collapsed with hardly perceptible and rapid pulse, cold perspiration and retching. It took a few hours before he was declared safe.

The factor of hypersusceptibility should always be in our mind though this factor is supposed to be least common with paraldehyde.

### Careless Administration of a Wrong Drug

Fatalities on the table may be due to the administration by mistake of a drug not intended or to *defects in the machine*. Two consecutive deaths on the same day have been recently reported from a hospital in England where the patients were killed due to the administration of pure carbon-dioxide in place of nitrous oxide. Carbon-dioxide and nitrous-oxide have also been given in place of oxygen and the patients killed.

Then again gases have been allowed to run through the chloroform bottle of gas oxygen machines instead of through that of ether or by leaks developing in the valve of the chloroform both thus overdosing the patient

Deaths have also been reported from *wrong connection* of bellows thus allowing liquid ether to run into the trachea with fatal results

### Late Ether Convulsions

This condition is another in the list of the causes of fatalities. The essential features are *epileptiform convulsive movements* beginning with twitchings in the muscles of the eye and face and becoming generalised, *cyanosis*, often intense, and a high rectal temperature

These severe convulsions of deep ether anaesthesia must be distinguished from the tremor of light ether anaesthesia which sometimes occur in a group of muscles or involve the upper or lower limbs or sometimes the whole body. They usually disappear on changing the position of the limb involved and on deepening the anaesthesia.

It is rather curious that in the practice of some it has never happened nor even a nonfatal case encountered, while with others there are reports of a series of cases within the course of a few months while none possibly for a score of years

Its incidence in Bengal may be said to be nil; careful enquiry from several surgeons and anaesthetists of long standing failed to bring out a single case. In my twenty three years' practice I have not met with one case

It occurs most frequently under Ether by the closed methods while given alone or with other anaesthetics. But cases of more or less similar convulsions have been seen under Ethyl chloride, Nitrous oxide, Vinyl ether, Novocaine, and Barbiturates though less frequently

It is seen most commonly in association with sepsis, high temperatures of the body and the atmosphere and in children and the young

Causes of this condition are not definitely known, but many different factors have been held to be responsible, viz, *impurities* in the ether, *overdosage*, *idiosyncrasy*, *carbon-dioxide air balance*—lack or excess, *sepsis*, *calcium deficiency*, *hyperthermia* from atmosphere, blankets, mackintosh covering, atropinisation and sepsis

It is suggested that the motor excitability is heightened by the various factors mentioned above. Then some stimulus during inadequate anaesthesia is required to start the convulsions. In abdominals it has often started during opening or closing of the peritoneum,

**Prevention** is best effected by avoiding ether in children with sepsis and high temperature, and avoidance of neurogenic trauma by gentle surgery and adequate depth of anaesthesia. Barbiturates offer no immunity but are good for combating convulsions.

**Treatment** is carried out by the withdrawal of the anaesthetic and cessation of the operation, reversed Trendelenburg position—to relieve congestion of the brain, momentary compression of the carotids, oxygen with or without carbon-dioxide, intravenous calcium and barbiturates, several recoveries have been reported after Evipan Sodium and Pentothal intravenously. But it must be used with caution and should not be continued if convulsions do not cease after a reasonably safe dose. Safety-pause must be adhered to.

**Sudden Acute Dilatation of the Heart and Rupture of Cerebral Vessels**—may happen in subjects with damaged myocardium or atheromatous vessels due to raised blood pressure which sometimes occur during anaesthesia, especially in association with hyperpyrexia.

**Massive Atelectasis**—usually produces post-operative pulmonary troubles though death may occur on the table if the area of the lung affected is extensive.

**Status Lymphaticus**—must be an extremely rare cause of death, if it occurs at all in Bengal. I have enquired from several surgeons and anaesthetists with extensive practice but none of them have met one and neither have I. The only doctor to my knowledge who met with two cases in his own practice in a mofussil town of Bengal during the short period of his first three years' work, said "Unless the two children were cases of Status lymphaticus, why should they so suddenly die under chloroform and so early?"

### Explosions

Deaths from anaesthetic explosions, a not uncommon cause of fatality on the table abroad is however fortunately extremely rare in our country especially in Bengal. I have no knowledge of a single fatality from this cause though I narrowly escaped an accident a few years ago while a full pound bottle of ether fell on the floor and broke. Within a few seconds the whole area where I was giving the anaesthetic was involved in flames. Fortunately the flame lasted a few seconds only and none present was injured.

The source of fire was the gas oven at a distance of at least eight feet from the place where the bottle broke, with a wall intervening having a communicating door.

The reasons why this accident is almost unknown here are among others, the general use of CHLOROFORM—a non-inflammable anaesthetic, LIMITED USE OF ELECTRICAL MACHINES and almost universal USE OF OPEN-ETHER—though a highly inflammable anaesthetic is not very dangerous when given by this method. Another very important cause of its rarity is the ABSENCE OF THE DANGER FROM STATIC ELECTRICITY the production of which is not favoured due to the humid condition of the atmosphere of Bengal—Static sparks are unlikely with a humidity of 60% or over.

In fact Static spark is the most dangerous source of fire in the operation theatres in many places in Central Europe and America where accidents from Static spark are daily on the increase because of the growing use of electrical machines in surgery and air conditioning of theatres, with the atmospheric conditions favouring generation of static electricity.

It often arises from the least expected quarters. As an example may be mentioned that an amount of Static electricity may be generated in the rubber mask and tubes of a gas-oxygen machine simply due to the friction of the running of the gases through them and a spark may be produced at the patient's face during the taking away or putting on of the mask over the face. Fatal accidents have actually happened due to explosion of highly inflammable gases and vapours from this cause only.

A good deal of research has been made and is being made in those countries during recent times to prevent and combat this menace. Various means of preventing these accidents by increasing the moisture inside gas bags and tubes, and by the grounding of anaesthetic machines and operation tables by trailing chains, etc., have been suggested and adopted.

To prevent accidents from explosions it is worthwhile remembering that, for all practical purposes, we are always working with explosives while operating under anaesthetics, because all the inhalation anaesthetics except chloroform and nitrous-oxide are highly inflammable. Ether is inflammable and with nitrous-oxide or oxygen makes a highly explosive mixture. Therefore one should always avoid every form of general anaesthetic except *chloroform*, *nitrous-oxide oxygen* and *intravenous barbiturates* while working with naked flame cauteries or in fact any electric appliances such as are in frequent use nowadays, *viz*, diathermy machines, x-rays, endoscopic instruments like bronchoscopes, oesophagoscopes, etc.

Pure ether unmixed with oxygen from a cylinder, while given by the open-method is not very dangerous because inside the air passages there is not enough oxygen to produce explosion and fatality. There is another favourable feature of ether while given by the open method. The ether vapour is about two and a half times heavier than air and so collects at the

bottom over the floor. Therefore if there is a source of fire above the level of the mask it is not likely that the vapour will catch fire unless the vapour is directed towards it by the air current. This factor is of great advantage now-a-days while **during an air-raid** the electricity may fail and we may have to fall back upon gas or kerosene lights while giving ether. It is estimated that if the light is kept at a height of eighteen inches from the mask and no air current is directed upwards the vapour will not catch fire, but one must be on one's guard not to keep any such light on the floor.

### Relative Safety of the more Common Anaesthetics

From the point of view of immediate mortality I think gas and oxygen is the safest in the hands of the skilled, Ether comes next as regards the incidence of death on the table whatever may be said about its mortality and morbidity during the post-operative period.

**Chloroform** and **Spinal** may be considered equally dangerous on the table, spinal probably more so. Among two beginners—one with spinal only and another with chloroform the one with the former is likely to have more deaths at least in his first few hundreds than the one with the latter. Spinal requires more pick-and-choose than chloroform.

**Intravenous barbiturate** has a fairly high mortality so far (0.11% to 14%)<sup>11</sup>, and its safety on the table is said to be only less than that with chloroform. I am beginning to feel that with the single-dose method in properly selected cases its safety is high if injected with strict adherence to details, in short operations requiring no relaxation and where a little movement is not a hindrance to the surgeon.

Local infiltration with **novocaine** in dilute solutions has a safety on the table in my opinion unequalled by any method general or spinal.

On the whole and for all practical purposes I should think there is nothing safer than open ether if death on the table is to be avoided. In fact it is difficult for a beginner to kill a healthy adult by overdosing with open ether only without any previous basal anaesthetics. I may summarise my opinion by mentioning that if I were given only one drug and no other I would choose ether.

### Are these Deaths Preventable?

The majority of deaths on the table are avoidable and the number of deaths that will be averted will increase with the experience, skill and care of the Surgeon and the anaesthetist.

Detailed discussion on the prevention of deaths in cases where death is due to the operation acting as primary or contributory factor is the domain

of the Surgeon in which I am not competent to encroach but I may be permitted to cite two types of cases to illustrate my point

### CASE I

Cholecystic disease—6 months—with marked jaundice, repeated colics, fever and rigor with an impacted stone in the duct in a Bengali female under 5 stones and a blood pressure of 90 mm. Hg systolic and 60 mm Hg diastolic

Surgeon Mr A carries her through under gas and oxygen by rapidly removing the stone from the retroduodenal portion of the duct leaving the very adherent gall bladder for a subsequent date

Mr B in similar circumstances tries to do a complete business with an anaesthetist who has nothing better than chloroform The patient expires on the table They think it was unavoidable

### CASE II

Mr A refills a shocked exsanguinated and almost pulseless patient with blood and its derivatives and performs an amputation in peace in a hopelessly injured thigh

Mr B in a similar situation, in trying to avoid death on the table does a hurried perfunctory operation under chloroform and creates a scene—the surgeon shouting and the patient gasping with subcutaneous saline still collected under the skin and a glass-funnel dangling over the nose with oxygen running at the generous rate of forty bubbles per minute!

### Prevention of Deaths due to Anaesthesia

The majority of deaths due to anaesthesia are avoidable and the most important factor is not this or that anaesthetic and machines but the experience and skill the administrator has acquired A safe anaesthetic like nitrous-oxide may be dangerous and even fatal in the hands of the inexperienced even in a minor and short operation, whereas the most dangerous chloroform may be quite safe with one who is skilled and experienced in it in a major operation

The progressive changes in colour, pulse, respiration and the skin are allowed to pass unobserved before the eyes of the less experienced and when ultimately after minutes of danger signals the patient dies he thinks that it was sudden and unavoidable The same signs at their very onset stare him in the face in his maturer days and by immediate appropriate measures he averts a catastrophe which he could not have avoided in his younger age

By previous experience he learns how much a particular patient can stand and what anaesthetic or its combination will be best suited In a shock-producing operation he chooses the right anaesthetic, does not increase the shock by too deep or too light a narcosis, scents an approaching danger at

the very moment of its inception and undertakes suitable measures to combat it and warns the surgeon in time to suit the operation accordingly. Thus he can steer his patient safely through a rough time which he could not have done in the beginning of his life

The more skill he acquires in the different methods of anaesthesia and the more experience he gains by their administration in various operations on different types of patients the better will he perform the duties entrusted to him and the less will be the number of fatalities not only on the table but also afterwards. Accidents become rare and sudden and unavoidable deaths almost vanish from his practice. In this connection the opinion of the anaesthetic committee of the British Medical Association is instructive. It states "They are convinced that by far the most important factor in the safe administration of anaesthetic is the experience which has been acquired by the administrator." Available records also point to the fact that fatalities often occur in the hands of the less skilled."

When it is agreed that the anaesthetist plays such an important part in the mortality on the table—and death on the table is not the whole story, a larger proportion of deaths after operation are really anaesthetic deaths, it is but fair that during operation competent anaesthetists are employed. In fact few can deny that many lives are lost because of the want of a good anaesthetist. At the risk of inviting criticism I quote John Elan<sup>12</sup> who says "that it is admitted by all that skilled administration of the anaesthetic is of equal importance with the skillful performance of the operation." There can be no doubt that many deaths could have been avoided had competent anaesthetists been available.

Therefore the public in their own interest and men in authority should realise that it is high time to have a larger number of competent anaesthetists all over the country. This can only be done if the prospects and status of the anaesthetists are made reasonably attractive.

**Co-operation between the Surgeon and the Anaesthetist** is essential if the mortality is to be brought down to the minimum. This usually arises from a long association with each other and is likely to be of maximum welfare to the patient when the Surgeon knows a little at least of the anaesthesia. Then he can realise the difficulties of the anaesthetist and by allowing a slight change in the position of the patient or relaxing a certain pull make all the difference and help the anaesthetist in his anxious moments. Occasions arise during many operations when the Surgeon has to yield and the anaesthetist rise to the occasion for the best interest of the patient and it is only an appreciative Surgeon who can do it.

I must confess with pleasure that Surgeons are now realising the importance of the anaesthetist for success in their operations and pays due

regard to his opinions not only 'during its performance but prior to it in difficult cases

Happily the days of the type of Surgeons are gone who while the anaesthetist says "the patient is not under" would jab in the knife with the words "if he is not under he will be under!"

For an anaesthetist there is really no trivial operation because the majority of deaths on the table have happened in these very trivial and minor cases. Therefore no operation under an anaesthetic should be approached with disrespect. Everytime an anaesthetic is being given the anaesthetist takes charge of the patient's life in his hands and takes him to death's door. It may be that the duration of this charge is shorter in a case of avulsion of the nail or phimosis as compared to a cholecystectomy but the degree of responsibility remains the same.

"A whiff of chloroform" or "a little gas" has very little meaning to an anaesthetist who knows what he is doing. A few whiffs may produce a ventricular fibrillation or a vagal inhibition and a little gas might asphyxiate his patient.

It is in one's nature to be particular and careful when one is undertaking a big operation but it is difficult to be equally careful and vigilant in a small operation. It is too often taken for granted that nothing will happen. It is here that a damaged myocardium goes undetected or a set of false teeth left in situ or a meal not forbidden. Here is a very instructive case. Two newly qualified doctors were at a small abscess on the thigh. Under a general anaesthetic as soon as an incision was made the patient expired. When all attempts at revival failed an intra-cardiac puncture was made. The syringe was filled with fluid from the pericardial sac under pressure. The doctor confessed to me that they did not examine the heart as "it was only a small abscess"—another avoidable death on the table.

### A few facts about Death on the Table conclude this theme

CHLOROFORM kills the largest number

Death occurs mostly in TRIVIAL OPERATIONS

ASPHYXIA and OVERDOSE together take the largest toll

More MALES THAN FEMALES die on the table

VENTRICULAR FIBRILLATION and VAGAL INHIBITION are **REAL** dangers

OXYGEN CANNOT KILL on the table—even in 100% concentration<sup>13</sup>

So don't spare a bountiful flow in uncountable bubbles,

TRENDELENBURG POSITION and GRAVITY are our allies

“The cortex can be kept from death—for hours by the merest trickle of blood” (Leonard Hill)

My thanks are due to Dr P Chatterjee, M B, F R C S E, Professor of Clinical and Operative Surgery—Calcutta Medical College—for his kind help and valuable suggestions

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# BENIGN METASTASISING GOITRE—REPORT OF A CASE

BY

JESSIE A. MATHIAS,

GENERAL HOSPITAL, MADRAS.

Since Cohnheim reported his case of metastasising Colloid Goitre, great interest has been attached to secondary thyroid tumours of bone where the thyroid is either normal or the seat of a benign primary growth so small as to be sometimes over looked. In Cohnheim's case, the lobes of the thyroid were uniformly enlarged and presented the appearance of simple Goitre, while in the left lobe were three large nodules of ordinary gelatinous adenoma, one of which had penetrated the lumen of the Inferior Thyroid Artery. Extensive metastatic tumours were found in bronchial nodes, lungs, femur, and lumbar spine. All these tumours gave the typical alveolar structure of the thyroid and in only a very few cell groups was a lumen with colloid absent. Similar cases have been reported since then by Langhans, Furer, Middleldorpf, Coates and A Meyer. Joll (1923), collected a series of 44 cases, in which secondary deposits in bone possessing histological characters of thyroid tissue co-existed with apparently simple goitres or a normal thyroid.

If Cohnheim's interpretation is accepted it raises the vital question of whether or not benign tissues can disseminate. The issue is not clarified by the introduction of yet other terms such as "Metastasising Struma of Langhans," "Latent Cancer of Carrel," "The Return towards Normal" of French writers, or again, the "Mysterious Malignant Adenoma" of Jacobson.

## Case Report

A woman aged 50 was admitted in the Madras General Hospital on 16-3-1943 complaining of pain in, and inability to, raise the left arm. She stated that for the last two months she had had pain in the left upper arm which she thought was due to an inoculation of anti-Cholera vaccine that she had received at the time. Three days before her admission into Hospital, while rising from the ground, she supported herself on her left arm and suddenly felt the limb give way with a crack.

On examination, the upper half of the left arm showed a fusiform, tender, bony swelling, there was evidence of a fracture in the upper third of the Humerus. The muscles of the left shoulder girdle and the Pectorals on that side showed considerable wasting and the skin moved freely over the tumour and there were no dilated veins on the surface.

The Radiologist's report on the X-ray of the left arm was —Considerable expansion of the upper third of the shaft of the left Humerus not extending beyond the surgical neck. There is an attempt at the formation of a capsule with trabeculation, but the

capsulation is definitely wanting on the external aspect showing infiltration of the soft tissues. The attempt at trabeculation is also feeble. There is intense decalcification of the affected area and a pathological fracture through the lower part of the tumour area (Fig 2)

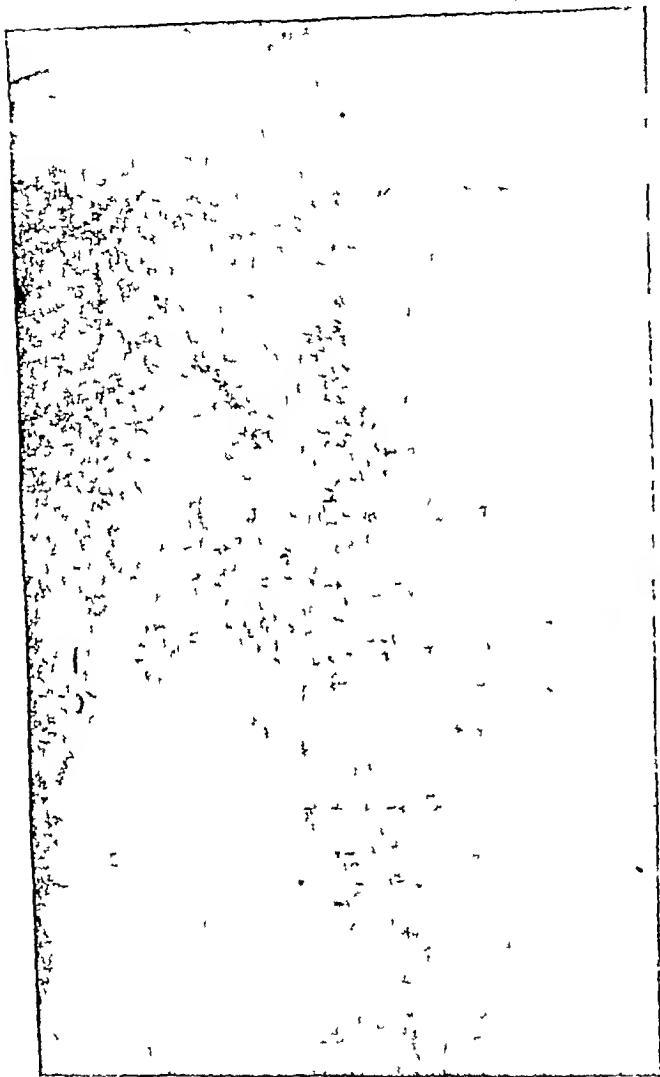


Fig 2 Skiagram of left Humerus



Fig 3 Photomicrograph of tissue removed from the Humerus showing typical Thyroid tissue with acini filled with colloid

The differential diagnosis based on these findings is —

*Osteoclastoma*—The trabeculation and encapsulation is not typical of this condition, the site is not the usual one and the history too short

*Osteogenic sarcoma*—X-ray appearance is not in favour even of the osteolytic type

*Secondary deposits*—The intense destruction of the bone is in favour of the above but such trabeculation is unusual except in rare cases of secondaries from the thyroid

Examination of the breasts and vaginal examination showed no evidence of carcinoma, but in the left lobe of the thyroid was a hard nodule, the size of a small marble,

situated just medial to the sternomastoid, it moved with deglutition and was not fixed to the skin. The patient was not aware of the existence of this nodule.

On 29—3—43, it was proposed to remove for Biopsy a portion of the bony tumour and the left half of the thyroid. The bony tumour proved to be extremely vascular and, as there was considerable haemorrhage, hemithyroidectomy was postponed to a later date.

The tissue removed showed, on histological examination, the structure of normal thyroid tissue (Fig 3). A month later, the thyroid was explored. The lower half of the left lobe showed a stony hard, calcified nodule which could not be cut with a knife. The whole lobe was removed and sent for pathological examination.

*Pathological Report*—Sections made from different parts of the thyroid removed show the appearances of a Colloid Goitre with areas of Foetal Adenoma. The acini are of various sizes and are filled with colloid. The lining epithelium is flattened. There is no evidence of increased vascularity or of involutionary changes following Thyrotoxicosis. This is no histological evidence of malignancy.

### Comment

Cases of simple metastasis of thyroid tissue in bone may be classified as follows —

- 1 That which develops after the removal of the thyroid tumour
- 2 That which is associated with pathology in the thyroid such as adenomatous or colloid goitre
- 3 That which is associated with a clinically normal thyroid
- 4 That which is associated with a definitely malignant goitre

Ewing has pointed out that the peculiar so called sinusoidal character of the thyroid circulation is one which favours the dissemination of either normal or abnormal thyroid cells into the blood stream, owing to the absence of a basement membrane between the vascular endothelium and the glandular epithelium. Some pathologists, chiefly Wolfier, describe "reserve islets" of thyroid tissue which develop into adenomata and give rise to metastasis, benign or malignant. It is possible that trauma or strain along with the imperfect vascular endothelium may permit normal or benign thyroid cells to enter the circulation and give rise to benign metastases. The abundance of the capillary circulation and the absence of valves in the thyroid veins, especially of the inferior thyroid group has been emphasized by some writers.

The second theory that errors in development lead to inclusion of aberrant thyroid tissue in bones which give rise to benign tumours can hardly be maintained in view of the finding that bones least likely to contain aberrant thyroid tissue, such as the long bones, skull, ribs and spine are most often found to be the seat of metastases.

The occurrence of a single thyroid osseous metastasis has, however, been disputed by Ehrhardt who maintains that on autopsy, multiple deposits are always discovered Joll, on the other hand, has 'confirmed by careful post mortem examination' that the osseous growth may be the only metastasis in the body

No definite conclusions can, however, be arrived at as to the real nature of this condition which has long baffled pathologists till definite criteria necessary to differentiate malignant from innocent thyroid are forthcoming As it stands, careful examination of complete or serial sections of the thyroid with follow-ups and post-mortems may help to determine the true pathology At present, consensus of opinion favours Wolfier's statement —"When the glandular cells distributed by metastasis have given rise, in different situations, to tumours which not only grow but exert a destructive action on the bone, the primary tumour should be considered benign neither clinically nor anatomically even if its malignancy cannot be established by microscopical examinations"

My thanks are due to the Superintendent, Government General Hospital, Madras and to Dr N S Narasimhan, Surgeon, under whom the case was admitted, for permission to report this case and to Dr K M Rai and Dr D Govinda Reddy for the Radiological and Pathological reports

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# INTUSSUSCEPTION OF THE SMALL INTESTINES DUE TO POLYPOID - LOOKING MASS WHICH WAS SARCOMATOUS IN NATURE

BY

M G KINI, M C, M B, M CH (ORTH), F R C S E, F R S E,  
SURGEON AND SUPERINTENDENT, STANLEY HOSPITAL, MADRAS

Intussusception causing intestinal obstruction is common in India. It formed 16 per cent of the intestinal obstructions in the surgical practice of the King George Hospital, Vizagapatam and 9.9 per cent in the Government Stanley Hospital, Royapuram, Madras.

Various types of growths occur in the small intestines such as lipomas, adenomas, polypi, neurilemmomas and leiomyomas. Some of them undergo a malignant change, the connective tissue tumours become sarcomas and the epithelial ones become carcinomas.

One case appeared like a polypoidal growth to the naked eye and caused intussusception but proved to be sarcomatous in nature after microscopic examination.



Fig 4 Clinical picture of the tumour which had recurred after removal in the upper and outer part of the right leg.

A Hindu, male, aged 30 years, was admitted on the 27th March, 1939, for a recurrent tumour on the right leg in its upper and outer part with peroneal paralysis. He stated that at first a swelling occurred in the upper part of the right leg which was removed and it recurred in five months' time to the size shown in Fig 4. He also noticed a foot drop deformity of that leg.

On inspection a tumour on the lateral aspect of the upper third of the leg was seen, the skin over it was tender showing a longitudinal scar on the summit of the swelling—result of the previous operation. The swelling was nodular and the skin over it appeared red. On palpation it was warm to the touch and was fixed to the deeper structures. Though it felt firm it was not bony to the feel and so a tumour arising from bone was excluded and was confirmed by radiography (Figs 5 and 6). Inguinal glands on that side of the limb were found to be enlarged and firm to the touch. The patient had



Fig 5 & 6 Skiagraphs showing the soft shadows not connected with the bone

peroneal paralysis with a foot drop. There was no loss of sensation. The patient after admission developed remarkable dyspnoea and on examination the left side of the chest was found to be dull on percussion with diminution of breath sounds. The apex of the heart was pushed more towards the midline and the right heart was pushed over more on the right side. On aspiration of the chest, haemorrhagic fluid was drawn. On microscopic examination it was found to contain Red blood cells but no abnormal cells were detected. On the 5th day after the aspiration of the fluid from the

chest, dyspnoea was more remarkable and the patient showed signs of intestinal obstruction with symptoms of colic, constipation and vomiting. As his heart was pushed more to the right side due to haemorrhagic effusion (Fig 7) it was thought that the intestines were getting paralysed due to the embarrassment of the heart. This was negatived by a careful examination and the suspicion of intestinal obstruction having been confirmed, the patient was operated on under local anaesthesia. A right para median incision was used and on opening the abdomen an intussusception of the ileo-



Fig 7 Skiagram of the chest showing the massive effusion in the left side of the chest.



Fig 8 Is a resected portion of the small intestines showing the polypoid nature of the tumour projecting from the lumen of the bowel which is laid open

ileal type was found. When the intussusception was milked it could be reduced to a certain extent but complete reduction was prevented by the tumour which formed the apex of the intussusception. A resection of the small bowel with the intussusception was done and end to end anastomosis effected. The patient collapsed on the third day after operation. Unfortunately post-mortem examination was not permitted by the relatives.

The histo-pathological examination of the specimen removed showed it to be a sarcoma (Figs 9 and 10). To the naked eye, the tumour looked like a polypoid growth with a certain amount of degeneration (Fig. 8).

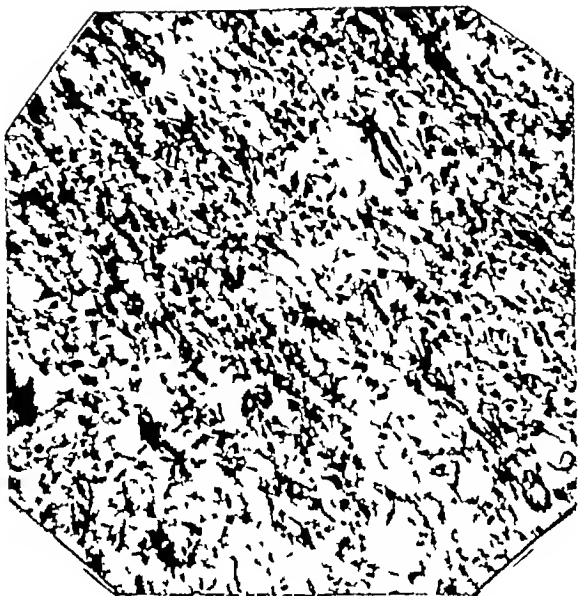


Fig 9 Microphotograph showing the cellular nature of the tumour.



Fig 10. Under high power the cells looked highly malignant

### Points of Interest

1 The patient had a tumour in the upper part of the leg which was removed but it recurred (recurring Fibroma, Sarcoma ?)

2 The patient developed haemorrhagic effusion in the chest Was this effusion due to the dissemination of the growth in the lung from the tumour in the upper part of the leg or from the intestines ? It is very difficult to say A post-mortem might have helped The patient developed intestinal obstruction on the 5th day after the aspiration of haemorrhagic fluid He was operated on and he died on the 3rd day after the operation suddenly

3 The pathological specimen shows to the naked eye a small tumour growing from the wall of the bowel projecting into the lumen with slight areas of degeneration On histological section it proved sarcomatous in nature (see pictures 8, 9 and 10)

# CONGENITAL RECTO URETHRAL FISTULA IN A MALE CHILD

BY

M G KINI, M C, M B, M CH (ORTH), F R C S E, F R S E,  
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Early in embryonic life, the Cloaca becomes differentiated in the male into the bladder and the rectum and in the female into the bladder, the vagina and the rectum. These organs are completely developed at birth, but developmental defects may occur in the following ways —

1 The rectum may develop completely but ending blindly descends right down to the site of the anal dimple which is not developed (Fig 11—i)

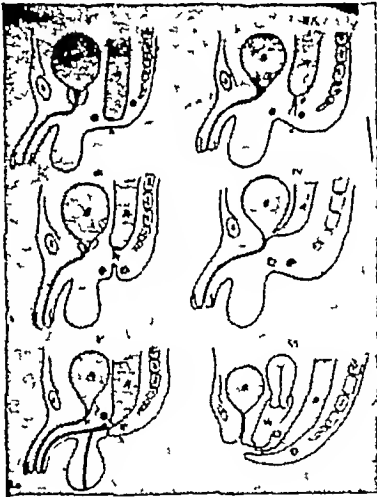


Fig 11 Is a diagrammatic representation of the developmental defects that occur in the region of the rectum



Fig 12 Illustrates the recto-vaginal fistula opening into the vestibule in the female child.

2 The rectum and the anus are incompletely developed with the result that the rectum ends blindly high up and quite a distance from the anal part with no communication (Fig 11—ii)

3 The rectum is imperfectly developed and ending blindly and descending right up to the developed anal dimple but with no communication (Fig 11—iii)

4 The rectum is developed, but is arrested in its descent and communicates with the bladder forming a fistulous tract with no development of the anal dimple (Fig 11—iv)

5 The rectum develops and descends incompletely with no corresponding development of the anal dimple and opens either, into the perineum or into the urethra causing a fistulous tract (Fig 11—v)

6 In the female, it generally opens either high up in the vagina or in the vestibule (Fig 11—vi and Fig 12)

There were 8 recto-vaginal fistulae seen in the female, all of the vestibular type, (Fig 12) and one recto-urethral fistula seen in the male (Fig 13) It is very difficult to give the incidence of this developmental defect in relation to the total number of births as records are difficult to obtain



Fig 13 Is a clinical picture showing the recto-urethral fistula at the peno-scrotal junction This at first sight looked like a case of Hypospadias of the peno-scrotal type On clinical and X-ray examination, the urethral development was found to be complete.

The following case is interesting because there was a recto-urethral fistula which resembled Hypospadias at the peno-scrotal junction at first sight but on closer examination there was complete development of the urethra, with which the rectum communicated by a fistulous tract

A Mohammedan boy was admitted for a fistulous tract at the peno-scrotal junction through which urine and faecal matter came out This was from birth At first sight it appeared like Hypospadias at the peno-scrotal junction but on careful examination, it was found that the urethra was patent right up to the tip of the penis. The urethra and the bladder were defined

by injecting Sodium Iodide through the urethra with an urethral catheter and through the fistulous tract Lipiodol was injected into the rectum by means of an urethral catheter showing the connection of the rectum to the urethra (Figs 14 and 15) This fistulous tract was dissected out under general

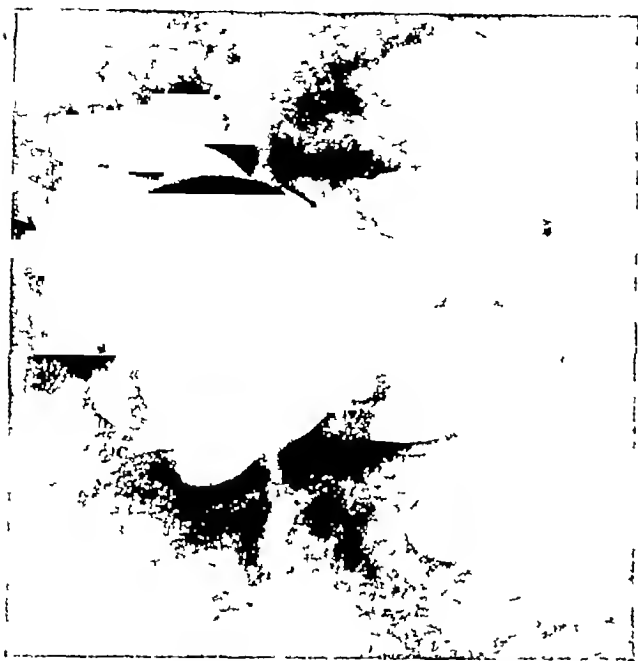


Fig 14. Is a skiagram taken after injecting the bladder through the urethra with Sodium Iodide

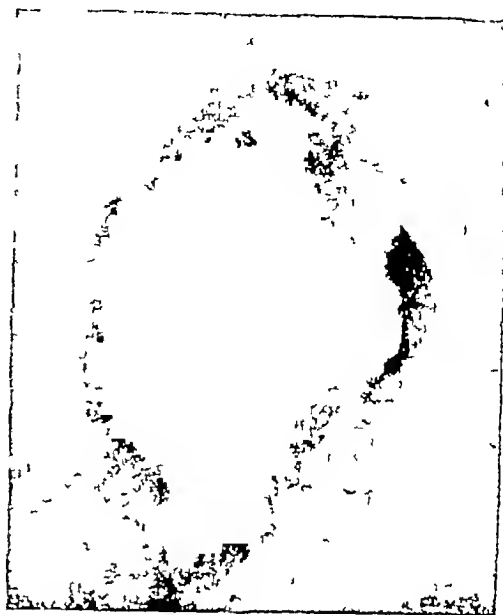


Fig 15 Is a skiagram showing the rectum after injecting it through the fistulous tract with Lipiodol. Note the distinct space between the rectum and the bladder and the connection of the former to the urethra by a fistulous tract.

anaesthesia right up to the wall of the rectum and then a needle-like-eyed probe was passed through this tract into the rectum and brought out through the anal orifice and the free end of the fistulous tract was stitched through the eye of this probe and the fistulous tract invaginated into the rectum, crushed and ligatured. The opening on the wall of the rectum was completely sutured and the wound sutured in layers without any drain. The patient made an uneventful recovery and according to follow up reports keeps good health with no recurrence of the trouble.

#### Points of Interest

- 1 One rare case of congenital fistula of the recto-urethral type is described
- 2 Radiograms taken define clearly this congenital abnormality
- 3 Operative procedure in this case was very simple and the result is very good.

# A CASE OF MULTIPLE SARCOIDS

BY

G D KAPUR, R B, M S, F R C S E

Mrs M—reported in September, 1942, for multiple swellings in both the legs, feet and right forearm with fever, pain, loss of sleep and general weakness

She was a well built women of 50 years, mother of four healthy children. She has led a healthy life except some 20 years ago, when she suffered from a skin disease marked by the development of discrete nodules, varying in size from a pea to a walnut. To start with, the nodules were hard and painful, after a time they would soften, then break down and eventually heal, leaving a thin scar. When she was seen in September, 1942 she looked ill and cachectic, exhausted with pain and sleeplessness and a temperature ranging from 100—102°F. Except for the scarring of her skin, due to what looked like healed ecthymatous lesions or erythema nodosum, the general examination revealed nothing outstandingly abnormal.

Blood report —R B C, 4 millions per cubic mm. Haemoglobin 72%, colour index 0.96

Urine report —Acid, Specific gravity 1026, traces of sugar. Blood sugar fasting level 80 mgrms per 100 c c. W R repeatedly negative. X-rays of the legs and feet showed general decalcification of the bones of the tarsus and ankle.

The following swellings and ulcers were noted —

- (1) A swelling 1" in diameter over the right shin anterior surface about its upper third. Soft and fluctuating.
- (2) Another swelling firm and elastic  $\frac{3}{4}$ " in diameter on the dorsum of the left foot, lateral side.
- (3) Another swelling separated by an inch of healthy tissue medial to the former.
- (4) Another soft elastic swelling below the medial malleolus.
- (5) An ulcerating area about  $2\frac{1}{2}$ " in diameter over the lateral malleolus of right foot.
- (6) An indolent ulcer 1" in diameter over the dorsum of the right forearm  $1\frac{1}{2}$ " above the wrist.

She was diagnosed as a case of Bazin's disease and the nodules were incised and these as well as the ulcers were scraped with a sharp spoon. The

Pathologist reported on the tissues sent "histological appearances are suggestive of tubercular infection" She however made an astonishingly quick recovery for tuberculosis within 3 weeks or so, the deep cavities left after sharp scooping filled over and epithelialized, and the ulcers got covered with a supple scar. A few days later, however, more nodules started growing up in both the legs, and the healed scars began to give way and turn into a sort of fungating sprouting tissue, with re-appearance of pain and other former symptoms. A consultation was held and it was thought that the lesions were not tubercular, but sarcoids in nature. In view of recurrence further operative interference was ruled out and the patient put on ultra violet exposures. After some 50 exposures and 10 weekly injections of Acetyl-Arsan (one ampule contains 15 grms of arsenic) the sprouting and fungation of tissues have gone and the lesions have completely healed up.

The chief interest of this case lies in the fact that various inflammatory lesions of the nature of a granuloma both clinically as well as histologically exhibit neoplastic characters. They appear as multiple growths, infiltrate the tissues, and after attaining variable sizes sometimes disappear to one's surprise. Although originating from many foci, there are no genuine metastases and for want of a clear appreciation of their nature, are classed as sarcoids.

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**ANNUAL MEETING** The 5th Annual Meeting of the Association of Surgeons of India will be held at Hyderabad in December, 1943. The exact dates will be announced later. Dr M R Munawar Ali, F.R.C.S., Surgeon, Oosmania Hospital, Hyderguda, Hyderabad (Deccan) is the Local Secretary and all members who propose to attend the Meeting are requested to get into touch with him. The following subjects will be taken up for discussion —

- 1 Laryngeal Carcinoma by Dr H. D. Gandhi and Dr S. G. Joshi, Bombay
- 2 Injuries of the Thorax by Dr C. S. Patel, Bombay
- 3 Surgery of the Gall Bladder by Dr P. Chatterjee, Calcutta

## SUBJECTS FOR DISCUSSION FOR LATER MEETINGS

### 6th Meeting

- 1 Traumatic Surgery of the Skull by Dr R. N. Cooper, Bombay
- 2 Carcinoma of the Breast by Dr N. C. Joshi, Delhi
- 3 Urinary Lithiasis by Dr L. B. Joshi, Karachi.

### 7th Meeting

- 1 Carcinoma of the Rectum by Dr C. P. V. Menon, Madras
- 2 Enlarged Prostate by Dr S. R. Moolgavkar, Bombay
- 3 Fractures of the neck of the Femur by Dr. B. N. Sinha, Lucknow,

## 8th Meeting

1. Carcinoma of the Cheek by Dr B M Joly, Delhi
2. Tuberculous disease of the Spine by Dr S P Srivastava, Agra
3. Hare Lip and Cleft Palate by Dr S C Sinha, Calcutta

\*                      \*                      \*                      \*                      \*

The term of the existing Governing Body having expired, the election will be held along with the Annual General Meeting. Nominations have been called for and Voting papers will be sent in due course.

Members are requested to inform the Secretary of any change in their addresses.

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## ERRATA Vol V—No 3—September, 1943

The Editor regrets very much that a few errors have crept in in the article headed 'Death on the Table' by Dr M C Ganguli, published in the Indian Journal of Surgery (Vol V—No 3—September, 1943) The following corrections may please be made in the article —

*Page 26 lines 5 and 6*

For 5% solution of Novocaine — read 0.5% solution of Novocaine

For 33 grms — read 33 grains

*Page 28 line 3 of Para 1 and 9*

For both — read bottle

For air-balance — read imbalance

*Page 22 line 9*

For special — read Spinal

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# THE INDIAN JOURNAL OF SURGERY

Vol. V

DECEMBER 1943

No. 4

## VESICAL CALCULUS

(operation for "asmari")

अथातुरमुपस्निग्धशुद्धमीषच्च कर्शितम् ।  
अभ्यक्तस्त्रिवपुषममुक्तं कृतमङ्गलम् ॥ ४५ ॥  
आजानुफलकस्थस्य नरस्यांके व्यपाश्रितम् ।  
पूर्वेण कायेनोत्तानं निषण्णं वस्त्रचुम्भले ॥ ४६ ॥  
ततोऽप्यकुञ्चिते जानुकूर्परे वाससा दृढम् ।  
सहाश्रयमनुष्येण बद्धस्याश्वासितस्य च ॥ ४७ ॥  
नाभे. समन्तादभ्यज्यादचस्तस्याश्च वामत. ।  
मृदित्वा मुष्टिना कामं यावदश्मर्यधोगता ॥ ४८ ॥  
तैलाक्ते वर्धितनखे तर्जनीमध्यमे तत ।  
अदक्षिणे गुदेगुल्यौ प्रणिधायानुसेवनीम् ॥ ४९ ॥  
आसाद्य बलवत्ताभ्यामश्मरौ गुदमेद्भयोः ।  
कृत्वान्तरे तथा वस्ति निर्वलोकमनायतम् ॥ ५० ॥  
उत्पीडयेदङ्गुलिभ्या यावद् ग्रन्थिरिवोन्नतम् ।  
शल्यं स्यात्सेवनीं मुत्तवा यवमात्रेण पाटयेत् ॥ ५१ ॥  
अश्ममानेन, न यथा भिद्यते सा तथा हरेत् ।  
समग्रं सर्पवक्त्रेण ;.. ..  
विशल्यमुष्णपानीयद्रोण्या तमवगाहयेत् ।  
वया न पृथक्तेक्ष्णे वस्ति ; पूर्णे तु पीडयेत् ॥ ५५ ॥  
मेढ्रान्तः क्षीरिवृक्षाम्बु ;  
.. .. स्वमार्गं सप्तरात्रत ।  
मूत्रे त्वगच्छति दहेदश्मरी व्रणमग्निना ॥ ६० ॥

ASHTANGA HRIDAYA CHIKITSA STHANA  
Chapter, II

*A regular course of स्नेहन-शोधन- i.e., administration of ghee, (oil or fats-as the case may require) steam-baths and then purgative, is recommended in ayurveda before almost all procedures of treatment, surgical or otherwise, with a view to ridding the system of any accumulated impurities. The operation for "Asmari" is to be performed when the patient is still a little weak, after undergoing such a course. On the day of the operation the whole body is anointed with oil and a vapour bath given. The patient should not have taken any food. The usual prayers are offered.*

*The patient is made to sit on a quilt-like thing made of cloth. A man is seated behind him on a stool, about the height of the knee, and the patient lies supine on his lap. The elbows and knees of the patient are flexed and the limbs secured by tying firmly to the seated man. In this posture he is allowed to rest a while.*

*Oil is applied round the umbilicus and then downwards and a little to the left and the parts massaged well.*

*The surgeon's nails should be trimmed and the fingers smeared with oil. The left index and middle fingers are gently introduced into the anus and the stone manipulated and forced downwards, taking care not to wrinkle the bladder wall. The stone is made to project in the middle line between the anus and the scrotum. Over this prominence and a little to the left of the middle line, an incision, just the length of the stone, is put, and the stone extracted with the instrument, known as Sarpa-Vakthra, taking care that the stone should come out whole, and not break.*

*The patient, who is thus relieved of the foreign body, is given a hot hip-bath, so that the bladder may not be filled with blood. But if there is internal bleeding a decoction of astringent barks is injected into the bladder.*

*In case urine is not passed through the natural passage within seven days, the wound should be burnt with the actual cautery.*

*(Apparently, the patient is put in the lithotomy position, leaning back, with his head resting on the lap of the man seated behind. The mid-line of the perineum might have been avoided, as it was considered a "marma" dangerous spot. The operation was attempted only as a last resort, where all medicines had failed and the patient's life was in*

*danger Even then the consent of the king had to be taken He was approached with a declaration—"अक्रियया ध्रुवो मृत्यु , क्रियाया सशयो भवेत् , निश्चित स्यापि वैद्यस्य बहुशः सिद्ध-कर्मण."*—*In case of non-interference, death is certain If operation is performed, there is a chance But it is a doubtful chance, even with a surgeon thoroughly acquainted with the art and who has been successful in previous cases—From this statement it is evident the operation was considered very risky and no wonder it was, in the absence of all antiseptic and aseptic precautions and when the use of anaesthetics was unknown Particular stress is laid on the point that the stone should be extracted as a whole, because if broken by any mischance there was the danger of small pieces being left behind An operation for the removal of it, a second time, it is said, could not succeed—"वस्तिभेदोश्मरीहेतुः सिद्धि याति न तु द्विधा ।"*

# PRIMARY CARCINOMA OF THE JEJUNUM

(With report of a case)

BY

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Primary malignant tumours of the small intestine<sup>1</sup> are rare compared to those of the colon and rectum. Kaufmann<sup>7</sup> states that over 60 per cent of intestinal malignancies arise in the rectum. The incidence of malignancy in the small intestine is estimated by Ewing<sup>6</sup> as 2.5 per cent as against 97.5 per cent in the large intestine. About equal numbers of carcinoma and sarcoma involve the small intestine primarily. Brill<sup>1</sup> collected 4 cases of carcinoma and 6 cases of sarcoma from 17,000 autopsies at Guy's Hospital, London. In Raiford's<sup>10</sup> series of 34 cases, 20 were carcinomas and 14 sarcomas. Edgar Morrison's<sup>5</sup> review of 2434 autopsies and 10,705 biopsy specimens yielded 8 primary malignant tumours of the small intestine, with equal numbers of carcinoma and sarcoma.

*Distribution in the small intestine*—Ewing<sup>6</sup> states that in location the tumours increase in frequency as one approaches the stomach above and the colon below and that the jejunum is least frequently the site of malignant growth. On analysing 134 cases of small intestinal malignancy, reported in the literature, including his own series, Medinger<sup>9</sup> found the distribution according to location as follows—duodenum—51 cases, jejunum—39 cases, ileum—44 cases. Mayo and Nettrour<sup>8</sup> reported from cases observed at the Mayo Clinic, 31 cases of carcinoma of the jejunum, 21 in the duodenum and 18 in the ileum. Variations in the relative frequency of primary carcinoma of the jejunum, compared to duodenal carcinoma, reported in the literature, appear to be due to the inadequate basis on which some of the cases of carcinoma of the duodenum are accepted as primary, since primary pancreatic carcinoma and primary ampullary growths invading the duodenal mucous membrane have to be excluded after careful scrutiny.

### Aetiology

*Age*—The ages of the patient reported by Mayo and Nettrour<sup>8</sup> ranged from 34 to 64 years, the average being 51 years. In Medinger's<sup>9</sup> series of 22 cases, the average age for the carcinoma group was 56 years. Ewing,<sup>6</sup> however, says that they occur relatively often before 40 years.

*Sex*—The Mayo Clinic reports 47 cases of small intestinal carcinoma in males and 22 in females. In a series of 31 cases of jejunal carcinoma, 20 of the patients were men.

### Pathology

Two distinct forms of primary carcinoma are encountered in this region. Carcinoma developing (1) in a local or general intestinal polyposis or (2) as a localised adenocarcinoma with variations in structure (Ewing<sup>6</sup>). To the naked eye they tend to be either (1) constricting or stenosing or (2) polypoid in form. The majority develop from a single intestinal polypus and maintain an adenocarcinomatous structure. Rarely the tumour may grow away from the intestinal lumen into the free peritoneal cavity, producing no mechanical obstruction (Medinger)<sup>9</sup>.

*Metastasis*—This occurs frequently in jejunal carcinomata, first invading the mesenteric lymph nodes and peritoneum and then the liver, lungs and other internal organs. Craig<sup>4</sup> found metastasis in 11 cases of jejunal carcinoma in a study of 12 cases.

### Symptomatology

*Anaemia*—Weakness and easy fatigability are prominent symptoms. Blood examination reveals a progressive anaemia of the microcytic hypochromic type.

*Loss of weight* is present in the majority of cases (95%).

*Pain*—Abdominal cramps usually in the epigastrium below the umbilicus are complained of by many patients. This type of pain may vary in duration from several seconds to 3 or 4 hours. Localised stationary type of discomfort may be met with in some cases.

*Vomiting*—This is encountered in 95% of cases following other obstructive symptoms. The degree of intestinal obstruction determines the incidence of the symptom. Frequently it is self-induced to obtain relief.

*Constipation*—While intractable constipation is very rare, minor degrees of constipation or alternating diarrhoea and constipation are reported in many cases.

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*Constipation*—While intractable constipation is very rare, minor degrees of constipation or alternating diarrhoea and constipation are reported in many cases.

*Melaena*—Gross bleeding is rare, but the presence of occult blood in the stool is a very valuable sign (Mayo, Nettrour)<sup>8</sup>

*Visible Peristalsis and Distension* are seen in the later stages when the obstruction has become almost complete

*Abdominal mass*—In 5 out of 12 carcinomata of the jejunum, a mass was palpable in the cases studied by Medinger<sup>9</sup> Cases with intussusception present palpable abdominal masses

In general, anaemia, asthenia and increasing intestinal obstruction with obstructive vomiting are reported in the annular type of carcinomas, while acute intussusception and obstruction are noticed in the polypoid type of growth

*Roentgenological examination*—No case of X-ray diagnosis of the tumour before obstruction is reported (R F Carter)<sup>3</sup> However, Roentgenological examination with a contrast medium has been very useful in demonstrating the absence of lesions of the stomach, small intestine and colon in cases where there are present vague, indefinite gastro-intestinal symptoms and in cases of unexplained anaemia (Mayo, Nettrour) Important roentgenological evidence supporting the diagnosis is (1) dilatation of the stomach or small intestine with barium retention, (2) filling defect in the small intestine, (3) point of intestinal constriction as in partial obstruction, and (4) dense shadow The amount of gas, fluid and distension will depend on the level of the obstructing lesion and the degree of obstruction (Medinger)<sup>9</sup> Lesions simulating carcinoma of the small intestine roentgenographically are ulcer, polyp, benign tumours, diverticulum, tumours and cysts of the head of the pancreas, pancreatitis and retroperitoneal inflammatory or neoplastic masses (Medinger)<sup>9</sup> The roentgenogram of carcinoma of the jejunum reveals a narrowing of the intestinal lumen at the site of the lesion and compensatory widening proximal to the obstruction Coiling of the intestinal loops proximal to the lesion and distension are frequent findings (Mayo, Nettrour)<sup>8</sup> Gaber and Hiller have pointed out that retention of barium in the small intestine for more than 8 hours should arouse suspicion (quoted by Mayo, Nettrour)<sup>8</sup> A positive roentgenological diagnosis was made in 10 cases in a series of 31 cases analysed by Mayo and Nettrour

*Treatment*—Radical operation with side to side union and removal of regional glands is recommended Higher up duodeno-jejunostomy may be done (Cameron)<sup>2</sup> Of the palliative surgical procedures, entero-anastomosis was performed in 11 out of 31 cases reported by Mayo and Nettrour

*Results*—There is a primary mortality of 43.5% in resection and cure in 16% of cases (Hellstroem quoted by Carter) The average length of life following operation in 31 cases was 17.6 months (Mayo and Nettrour) Although the patients lived only a short time, the relief of obstruction and

the comfort of the patients seemed to justify the surgical procedure (Mayo and Nettrour).

### Case Report

The patient, a Muhammadan lady aged 34 years was first seen by one of us, on 20-6-'39 for symptoms of sub-acute intestinal obstruction, having been referred from the medical side of the General Hospital, Madras

*History*—Mother of 1 child 8 years old Married in 1922 Abortion soon after marriage in third month in 1923, had an attack of severe stomach ache and jaundice (attributed by her to some Unani medicine taken for gaining weight), which lasted about 4 months In 1924 attacks of colicky pain in the left iliac fossa started and continued on and off for 4 years in spite of treatment These attacks were temporarily stopped by a Unani Doctor in 1928, but she used to get attacks of headache relieved by vomiting Towards the end of 1933 she noticed a lump in the right breast This was diagnosed as a carcinoma and the breast was removed in 1934 (No histological proof of this is available) Colicky pains with flatulence and vomiting started again in March 1939 and have steadily become worse, for about a fortnight before admission she has been having persistent vomiting and severe pain

On examination the patient was seen to be emaciated with signs of dehydration, the abdomen was distended with coils of small intestine standing out in a ladder pattern A study of the barium meal pictures taken a few days before admission showed dilated coils of small intestine lying to the left of the middle line She was screened on the following day and the dilatation of the small intestine was seen to be greater now than before Small intestine obstruction of a sub-acute type was diagnosed and she was operated on (by C P V M) the same evening (21-6-'39) under local anaesthesia. A very much distended coil of intestine was encountered ending in a tight stricture beyond which the intestine was empty and contracted This stricture was thought to be tuberculous in nature and since the condition of the patient did not justify a radical operation a simple side to side anastomosis was performed short-circuiting the stricture No further exploration of the abdomen was done After a rather prolonged convalescence complicated by wound infection the patient was discharged

She remained well for about a year after the operation Then she started getting her pains again, but not as severely as before and carried on like that for nearly two years more In April, 1942, (i.e., nearly 3 years after the short circuiting operation), she presented herself for examination She was then seen to be very anaemic and complained of attacks of severe pain and flatulence There was no vomiting or constipation and she used to take her ordinary diet She was admitted in a private hospital for investi-

gation Her general health was good but for the anaemia Hb 57.5% RBC 3.55 millions per cmm WBC 6,800 per cmm Urine did not contain any sugar On examination there was a lump in the left side of the abdomen Skiagrams taken after an opaque meal did not reveal any obstruction Acting still under the belief that she was suffering from tuberculosis of the jejunum, she was sent for a course of treatment with ultra-violet rays and advised to take iron and liver extract

Three months later, she was admitted again into the private hospital since her symptoms had become worse for the last few days, though she was comparatively comfortable before that

It was now seen that the anaemia had progressed considerably, the Hb being only 25% and RBC 2.5 million per cmm, WBC 6,800 cmm, BP 105/60 Weight 98 lbs The lump in the abdomen had increased in size and now a definitely hard movable tumour about the size of a cricket ball could be felt The possibility of a malignant tumour was now considered for the first time and it was decided to explore the abdomen She was given a transfusion of 325 cc of re-constituted blood, apart from slight rigor towards the end of the transfusion, she took it well and a week later, the Hb had gone up to 60% (!) and the RBC to 3.1 million On 29-8-'42 she was operated on —by C P V M—under Chloroform-Ether inhalation anaesthesia The abdomen was opened by a lower left paramedian incision There was a tumour, the size of a cricket ball at the site of the old stricture and involving the mesentery The old anastomosis was seen to be still functioning The affected loop along with the infiltrated mesentery and a length of jejunum above and below including the old anastomosis (part of which was seen to be infiltrated by the tumour) was resected, immediately above the old anastomosis, a pedunculated polypoid tumour could be felt within the gut and this portion was also included in the resection The ends were closed and a large lateral anastomosis performed It was then noticed that there were many more of these pedunculated soft tumours both above and below the anastomosis and they commenced from the duodeno-jejunal flexure These had to be left alone with the exception of one situated rather too near the anastomosis for safety This was removed by enterotomy There were no distant metastases in the abdominal cavity There was a small cyst in the right ovary Other organs were normal Abdomen closed in layers Except for mild post-operative distension, convalescence was uneventful and she was discharged from hospital 16 days after operation

She was seen again in August 1943, i.e., one year later and was keeping very good health Her blood condition had returned practically to normal and she has been free from pain and flatulence and is enjoying her food There are no lumps to be felt anywhere in the abdomen. She has, of course, those multiple polypi in her jejunum and it is difficult to say whether they

will give any trouble if the carcinoma itself does not recur, which is not unlikely. No evidence of local recurrence of the breast carcinoma was noticed at the time of first examination or subsequently.

*Pathology Report*—The specimen (Fig 1) consist of 14" of the jejunum slit open longitudinally. Near the middle, there is a large irregularly-shaped excavated ulcer with indurated base measuring 4"  $\times$  1½". On the



Fig 1 Photograph of Specimen. A Large carcinomatous ulcer, B & C Adenomatous Polypi; D Line of old anastomosis

mesenteric aspect of this area, there is a mass (size 2"  $\times$  2"), of infiltrated lymph nodes. The mucous membrane proximally presents three polypi of varying sizes. The largest one (size 1"  $\times$  ¾") situated about 4" above the ulcer is irregularly lobulated and pedunculated. About 1" distal to this is seen a smaller lobulated polypus (size ½"  $\times$  ¼") also attached by a pedicle. In its vicinity is found a third tiny polypus. Distally, ¾" away from the ulcer, there is an oblique line indicating the line of anastomosis of the first operation. Further down there is a tiny nodular projection of the mucous

membrane, probably a commencing polypus. Microscopically the ulcer showed an adenocarcinomatous structure (Fig 2) and the mesenteric lymph nodes were found infiltrated. Section from one of the polypi presented an adenomatous pattern with thick strands of fibro-muscular tissue affording support for the enclosed glandular tissue (Fig 3).



Fig 2 Photomicrograph of section from the ulcer showing appearances of adenocarcinoma



Fig 3 Photomicrograph of section from one of the Polypi showing adenomatous structure

### DISCUSSION

The case reported above presents many interesting features and affords material for a considerable amount of speculation. The long history of intestinal symptoms dating from over 20 years ago is rather difficult to reconcile with the diagnosis of carcinoma of the jejunum unless the early symptoms were due to an adenomatous polypus which later became malignant, dropped off and left a constricting carcinomatous ulcer. Although polypoid and constricting varieties of carcinoma have been reported in the small intestine, the association of multiple polypi with a carcinoma—a condition well-known in the large intestine—has very seldom been recorded in the small intestine. This case would appear to be one of 'multiple polyposis' of the small intestine with carcinomatous change in one of them. This hypothesis presupposes the existence of the benign tumours for a considerable time, perhaps from 1924, the fact of their being not recorded at the first operation is of no importance if the circumstances under which the operation was done—an emergency operation for sub-acute obstruction when no abdominal exploration was done—are taken into consideration. For all one knows they might have been there at the time.

The history of a carcinoma of the breast having been removed 5 years prior to admission is also interesting. There does not seem to be any justification for suggesting any connection between it and the present condition. Though histological proof is lacking, the diagnosis of carcinoma in the breast must be accepted since the operation was done by a Surgeon of some experience. Can we take this as an instance of a peculiar tendency to atypical epithelial proliferation which shows itself in one situation or other?

The mistake in diagnosis made at the first operation is, to say the least about it, unfortunate in that it delayed radical treatment for a period of 3 years—a delay which, in malignant disease, is unpardonable. Strictures in the jejunum from tuberculous as well as non-specific ulceration have been met with frequently in the surgical practice of this Presidency, this fact and the desperate condition of the patient which prevented any prolonged exploration of the abdomen may be offered as extenuating circumstances. It is, however, a matter for consolation that even after three years the condition was found to be still operable and there were no distant metastases.

Some speculation as to the future may also be indulged in. Even if the carcinoma does not recur locally or elsewhere in the abdomen which is by no means unlikely, there is no saying what one of those polypi might not do, considering her tendency to form malignant tumours, carcinomatous change may overtake any one of them. Acute intussusception is also not unlikely. She is being kept under observation and so far she has been keeping excellent health.

### Summary

A case of carcinoma of the jejunum with multiple adenomatous polypi is reported.

Some interesting features of the case are presented. The literature is briefly reviewed and the pathology, symptomatology and treatment are discussed.

We are indebted to Lt-Col G R McRobert, I M S, Superintendent and Physician, General Hospital, Madras, who first referred the case to one of us.

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# INTRATRACHEAL ANESTHESIA IN SURGERY

(A study based on 400 cases of Intratracheal Anesthesia)

BY

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It has been the accepted practice until recently that the Surgeon was supposed to offer to his patient not only the best possible surgical skill, but was also expected to supervise his welfare and to direct his attention to the relief of pain during the operation. Fortunately this attitude is fast changing and surgeons have realised that anesthesia is a very specialised part of therapeutics, which can only be successfully tackled by carefully trained persons. An extension of surgery to all regions of the body, i.e., brain, heart, lungs, oesophagus, etc. has revolutionised the entire field of anaesthesia. It has introduced many new drugs, methods and techniques. One of the outstanding contributions to anesthesia in recent times has been the development of intratracheal anesthesia by Magill. It is intended in this paper to record our experience of this type of anesthesia during the last three years at the Tata Memorial Hospital.

*History*—The history of intratracheal anesthesia has been very extensively covered by Ralph Waters and his Associates in their paper "Endotracheal anesthesia and its historical development"<sup>1</sup>. These anesthetists show that many methods and points of technique, which have been advocated in recent years, were actually discovered by former observers. Fine of Geneva in 1800 and Dessault in 1801 were the first to use intubation through the nose as well as the mouth. Kahn of Germany in 1900 first used the method in man, but probably the greatest impetus towards popularity of intratracheal anesthesia was the work of Elsberg in 1909. Anesthesia was then maintained by the insufflation method, by which anesthetic gases were forced through a small intratracheal catheter, allowing sufficient space between the outer wall of the catheter and the vocal cords for the escape of the insufflated gases.

During and after the Great War the field of application of intratracheal anesthesia widened greatly and in 1920 Rowbotham and Magill put into use the method of to & fro breathing, instead of insufflation. Intratracheal inhalation with its freedom from pressure and the danger of emphysema together with its conservation of body heat and moisture, and acid-base equilibrium entirely supplanted insufflation.

In 1928 Guedel and Waters, in an effort to exclude blood and other operation debris from the trachea during intraoral surgery, devised an inflatable rubber cuff for intratracheal catheters.

The advantages in this form of anesthesia became widely recognised and its use rapidly extended to other surgical fields

*Apparatus required*—(1) Practically any type of continuous-flow, intermittent-flow or closed circuit gas-oxygen apparatus can be used. If no

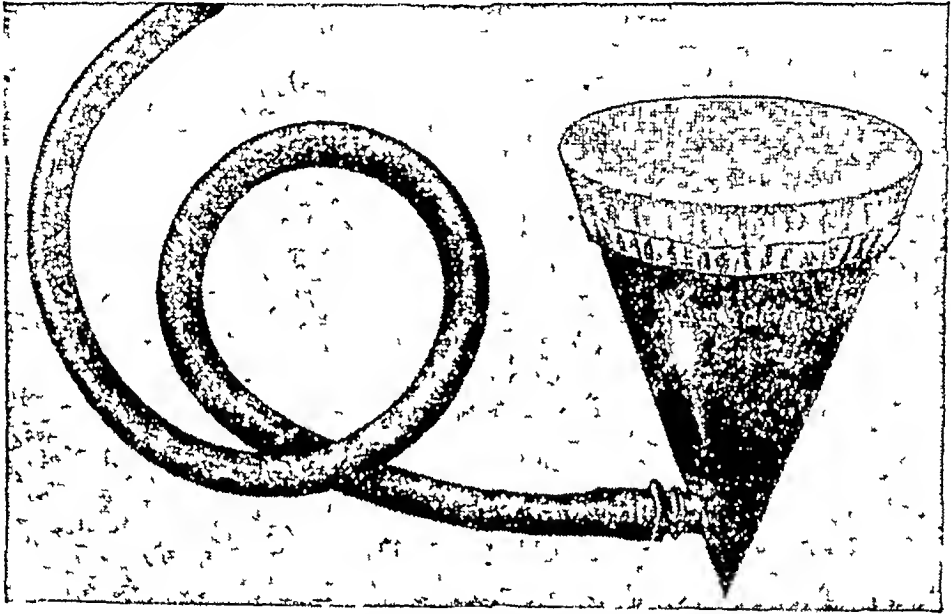


Fig 4

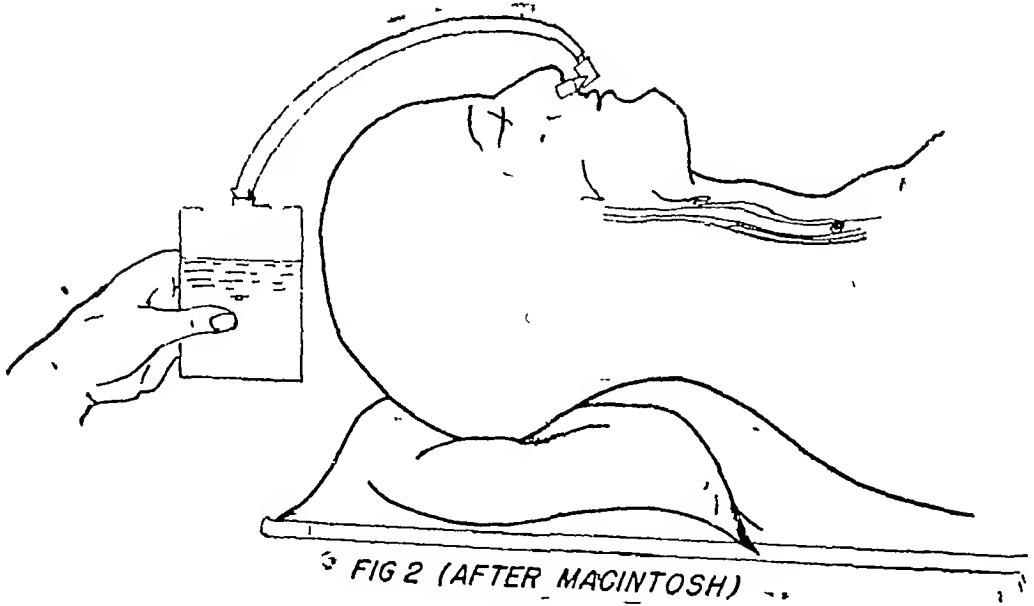


Fig 5

gas-oxygen apparatus is available, "open" ether or chloroform can be given by means of a Hahn's Cone (Fig 4) or by attaching the intratracheal tube to an ordinary tin in the top of which two or three small holes have been bored, a simple apparatus (Fig 5), or chloroform or ether can be pumped from a Junker's bottle connected by a Magill's adapter (Fig 6).

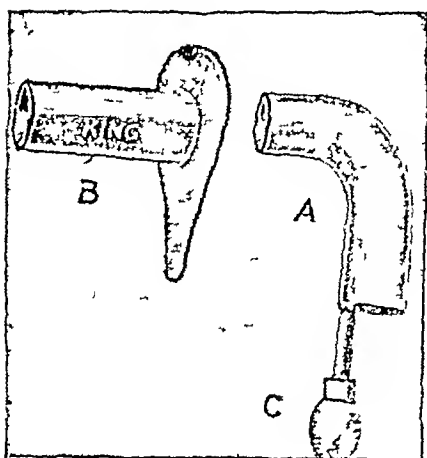


Fig 6



Fig 7 (1) Magill tubes, (2) Magill tube with Waters-Guedel Cuff (deflated), (3) Magill tube with Waters-Guedel Cuff (inflated), (4) Author's modified Guedel Laryngoscope (5) Magill's forceps, (6) Sircar connection, (7) Rovenstine connection, (8) Magill connection, (9) Rowbotham connection

If no apparatus of any description is available, the end of the intubation tube can be used in the same way as an ordinary airway and chloroform or ether administered from a mask held over the face as in the usual inhalation anaesthesia

(2) A direct vision anaesthetist's laryngoscope. The handle contains batteries for a sturdy lamp at the side and end of the blade. Various types of laryngoscopes are available, the one used in our clinic is a modification by the author of Guedel's Laryngoscope

(3) Magill tubes of various lengths and sizes—00, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10. These tubes are made of soft rubber with a standard symmetrical curve and to facilitate its passage through the glottis, the lower end of the tube is bevelled

(4) Magill tubes with a Waters-Guedel Cuff

(5) Catheter slip-joint which is made of metal One end should be of proper size to fit the tube and the other end to fit the adapter for the gas-machine

(6) Magill's forceps—to guide the tube under direct vision with the laryngoscope into the glottis

All the various tubes, laryngoscopes and other connections are shown in Fig 7

The laryngoscope and the tubes may be sterilized after thorough washing with soap and hot water, in alcohol or in 1-in-1000 Bimodide of Mercury

*Technique of passing Intratracheal tubes*—The tube may be passed through the nose or through the mouth When the oral route is chosen, the method almost invariably adopted is to expose the larynx with a laryngoscope and to pass the tube under direct vision When the tube is passed through the nose, a similar procedure may be followed or the tube may be made to enter the larynx "blindly"

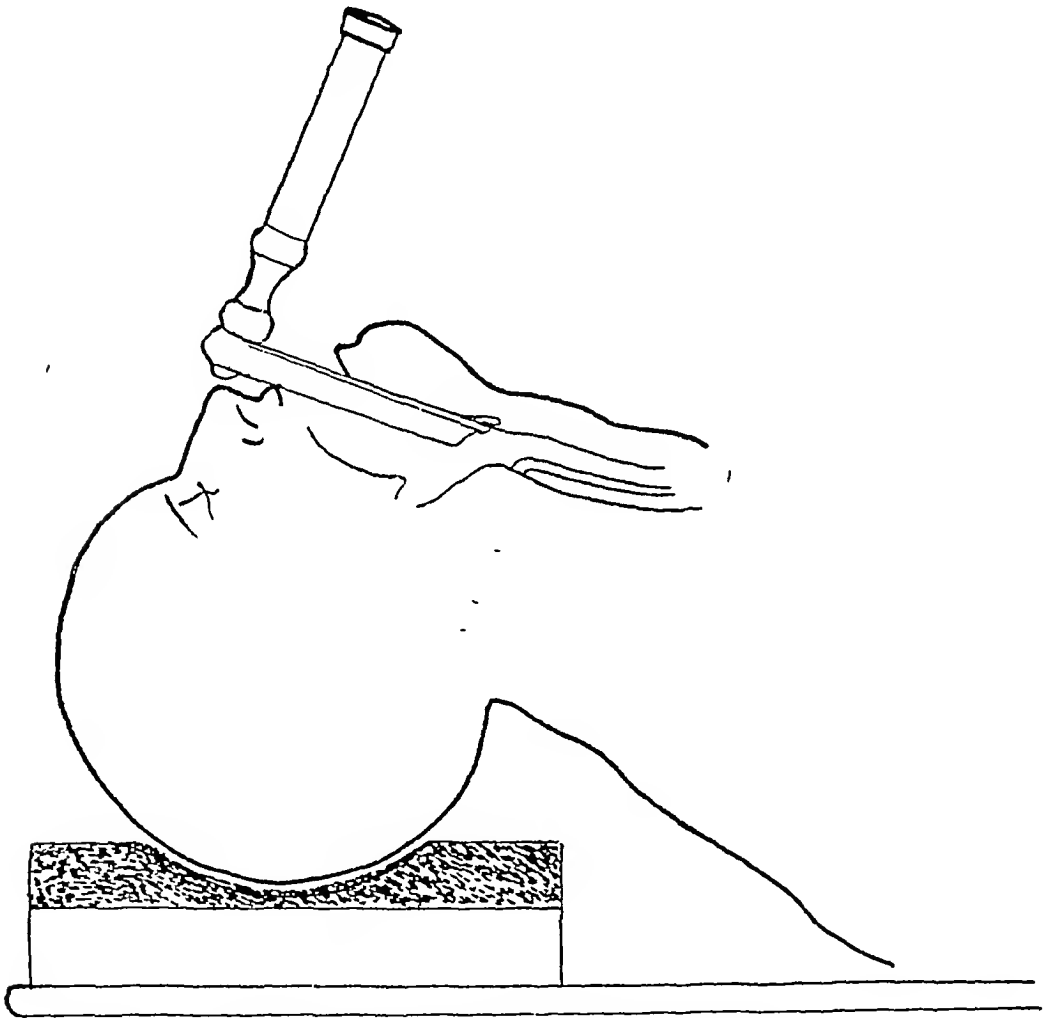
*Direct-vision Intubation*—The anesthetist who wishes to practice intratracheal anesthesia should learn the art of laryngoscopy first Early experience should be gained in the post-mortem room Later, by passing a laryngoscope at the completion of any operation when he has no need to hurry, he can familiarise himself with the appearance of the larynx in the living

A good exposure can be obtained only if anesthesia is deep and the position of the head correct Extreme hyperextension, with the head on the edge of the table, as adopted by some surgeons and anesthetists for bronchoscopy, is unnecessary In fact this technique increases the difficulty of intubation The position of the head should be as is shown in Fig 8, a position which can be obtained by the introduction of a support under the head in such a way as to flex the neck but extend the head

When anesthesia is deep and the jaw relaxed, which can be tested by trying to open the mouth, the laryngoscope being held in the left hand throughout, leaving the right hand free, the blade is introduced, the lips being drawn back to prevent them from being nipped between the teeth and the blade It is then passed backwards on the right side of the mouth along the right side of the dorsum of the tongue, which is thereby pushed towards the left Some anesthetists guide the laryngoscope over the middle of the tongue but the subsequent manoeuvre of "lifting the head" by the laryngoscope makes the tongue bulge over the blade and obstruct the view While the laryngoscope is being passed backwards, the head is slightly extended and

the mandible lifted upwards by the right hand so as to bring the mandible into a position approximately at a right angle to the table

When the laryngoscope has advanced about half the distance, the uvula is seen. A farther advance forward to the base of the tongue brings the epiglottis in view. Still advancing, the tip of the laryngoscope is directed towards the posterior pharyngeal wall and passed to about half an inch

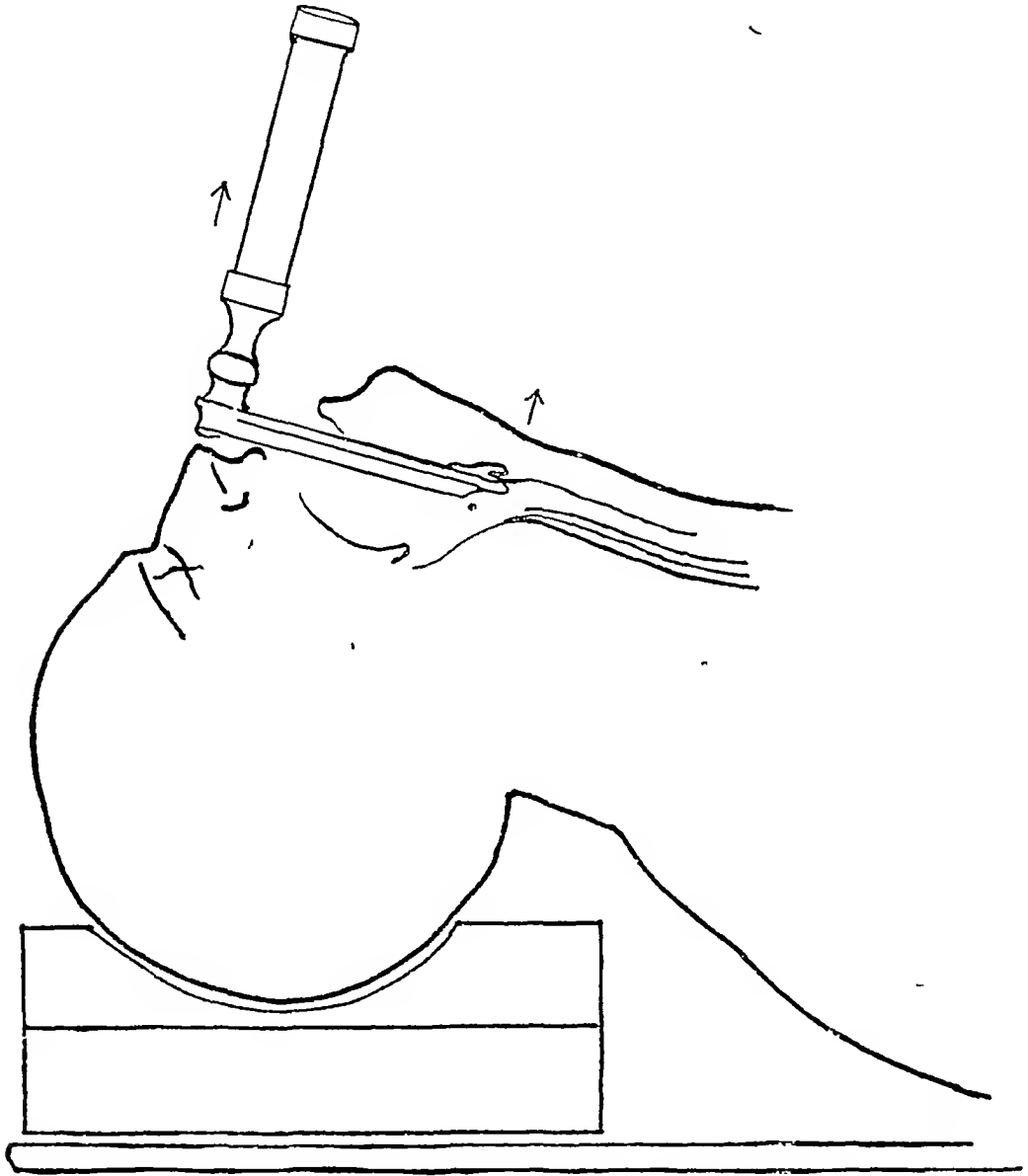


**FIG 5 POSITION FOR LARYNGOSCOPY  
( AFTER MACINTOSH )**

Fig 8

beyond the epiglottis. At this stage it may be necessary to further extend the head and the epiglottis is lifted upwards with the tip of the laryngoscope till the vocal cords come into view. This is the most difficult part of the whole procedure, the whole head should be lifted up by the blade (Fig 9)

with the fulcrum at his wrist and not using the blade as a lever with upper teeth as the fulcrum. If the latter procedure is done there is always a danger of chipping or dislodgment of the front teeth.



**FIG 6 LIFTING THE HEAD**

Fig 9

Once the larynx is exposed and if the glottis is widely opened, a lubricated intratracheal tube is introduced without force between the vocal cords. When oral intubation is done the tube should be passed by the side of the slot in the blade and not through the slot in the laryngoscope. Passing the tube through the slot invariably obscures the view of the glottis. Some anesthetists use a stylet in the intratracheal tube while passing the tube,

which is a useful method if the tube is of a soft variety. When the tube with a cuff is to be used, it is passed in the deflated condition through the glottis while the cuff's upper edge lies just beneath the vocal cords. Air is then injected from a syringe until the trachea is just filled<sup>3</sup> as evidenced by resistance in the syringe. Some tubes have a pilot balloon attached to the inflating tube which is supposed to act as guide to the degree of cuff distension but the author thinks that it merely gives an indication that the cuff is not leaking and the resistance in the syringe is the more important guide as to how much air should be injected to inflate the cuff. The importance of some such guide as to how much air should be injected is shown by a recorded case of rupture of a tracheal cuff with fatal result<sup>4</sup>. If the tube is to be passed through the nose by the "direct-vision" method, then it should be passed through the nostril and guided through the glottis simply by manipulating the end which projects from the nose. Should this procedure fail, the distal end of the tube which is in the pharynx, is picked up with a pair of Magill's forceps and guided into the larynx. After the intubation, the laryngoscope should be removed carefully, a gag or a rolled piece of gauze should be put between the teeth if the tube is passed through the mouth to prevent it being compressed by the teeth, and then the tube should be fixed in position with adhesive applied in the manner illustrated in Figs 10 and 15.

*"Blind" Nasal Intubation*—This is popularly known as Magill's blind intubation method<sup>5,6</sup>. The advantage of this technique is that it does away with laryngoscopy with all its danger of damage to teeth and soft palate and it can be performed under light anaesthesia. Both nostrils and pharynx are sprayed with a 10% Cocaine solution to shrink up the mucous membrane over the turbinates and to dull the reflexes which bring the cords in apposition. When the required level of anaesthesia has been reached, the head should be so placed that the neck is slightly flexed on the trunk and the head slightly extended at the occipito-atlantal joint, a "sniffing the air" position. A lubricated tube, the length of which is twice the distance between the nares and the lobe of the patient's ear, is then passed directly backwards into the nostril, the patency of which has been previously determined. Force should never be used while passing the tube, since soft tissues are easily damaged. When the tube reaches the pharynx the patient will be heard breathing through the tube. The anaesthetist should now keep his ear to the tube and gently push it farther during inspiration till it either enters the trachea or oesophagus or is held in the laryngeal entrance or passes into the pyriform fossa.

The signs, when the tube has entered the trachea, are so obvious that when there is any doubt about it, it may be assumed that it has not done so. Under light anaesthesia its introduction into the trachea will lead to a paroxysm of coughing while if anaesthesia is deep, the regular and easy respira-

tion characteristic of surgical anesthesia will be heard through the tube as soon as it has entered the trachea

If for any reason blind intubation fails, any of the following procedures may be of assistance the tube is withdrawn and passed through the other nostril or respiration may be stimulated by giving CO<sub>2</sub> to facilitate entrance into the larynx<sup>7</sup> If the tube is held up at the cords, it can be made to pass into the glottis by acutely flexing the head and maintaining gentle pressure on the tube If this also fails, the tube is moved slightly to & fro to irritate the laryngeal mucosa and stimulate coughing, when the cords will separate widely

### Discussion

*Advantages and Disadvantages of Intubation*—From the anesthetist's point of view there is a definite group of surgical cases in which intratracheal anesthesia is essential for the safety of the patient

TABLE I  
Regions of operations

Region	No of cases
Head	1
Face	22
Intraoral	... 190
Neck	33
Thoracic superficial	.. 13
Thoracic Intrapleural	. 18
Upper abdomen	. 61
Lower abdomen	.. 44
Extremities	... 5
Tracheobronchial toilet	10
Resuscitation	.. 3
Total	... 400

Table I shows the regions of operations where anesthesia by intratracheal method has been used in our hospital In 40 75 per cent of cases, it has been administered for intraoral surgery only Thus we see that intratracheal anesthesia is a method of choice for intraoral work<sup>8</sup> Intubation through the nose is an ideal method for operations within the oral cavity for it (1) gives the anesthetist complete control over the patient's airway under any condition, (2) eliminates the possibility of contaminating the lower respiratory tract with the contents of the upper respiratory tract by allowing the laryngeal entrance to be packed off, (3) removes the anesthetist from close proximity to the field of operation and (4) allows the surgeons to

work in the oral cavity without obstruction to their movements or vision by unnecessary apparatus



Fig 10 Shows the set up of a case for intra oral surgery The tube has been passed through the nose and the laryngeal entrance packed off by roller gauze

*Report of a case*—L I, a man of 25 years of age was admitted with a swelling of the right side of the face. A pre-operative diagnosis of fibro-osteoma of the mandible was made and the patient was operated upon under gas-oxygen-ether anesthesia with nasal intubation. The right half of the mandible was removed with the tumour (Figs 11 and 12)



Fig 11 Photograph before operation

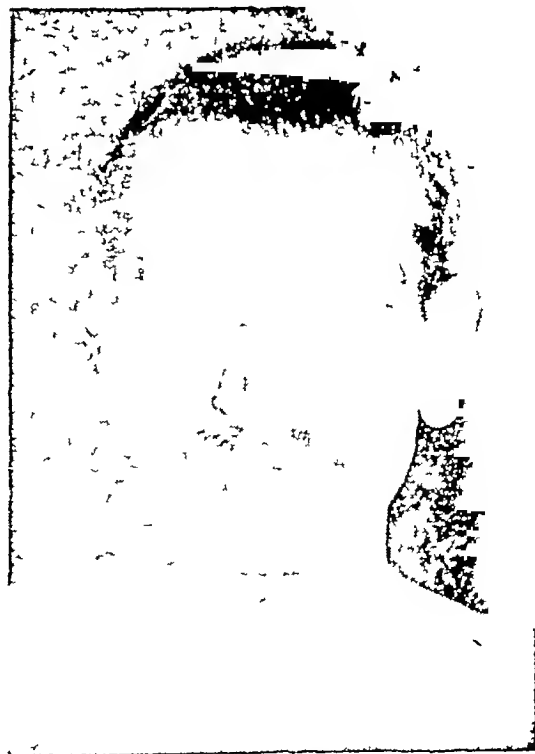


Fig 12 Photograph after operation

In some cases intratracheal intubation through the nose might not be possible due to obstructed nostrils or deformed nostrils due to tumour. In those cases the surgeons will have to work with the tube in the mouth. In one of our cases nasal intubation was impossible due to complete distortion of both the nostrils by a tumour of the maxilla and the surgeons had to operate with a tube passed through the mouth.

Trismus, either partial or complete, is a problem for intubation in oral cancer where "direct-vision" intubation is impossible. Five of our cases had to be operated upon with complete trismus. In these cases intubation was done blindly through the nose in the conscious patients with local anesthesia only and once the patient's airway was controlled general anesthesia was administered with other agents as indicated for that particular case.

When the larynx has been packed off by the surgeon, the anesthetist must himself make sure that the intratracheal tube is not compressed by the packing. A fatal result may easily occur if the tube is compressed, especially when sodium pentothal anesthesia is being used. We always check the tube before the surgeons start operating by listening on the breathing bag or watching the respiration for signs of obstructed breathing.

If a general anesthesia is to be given for any prolonged operation on the head and neck, it is desirable that it should be administered through an intratracheal tube.

*Report of a case*—S L, man of 51 years of age, was admitted for an adenomatous goitre of 15 years duration. A bilateral thyroidectomy was done under cyclopropane anesthesia with oral intubation (Figs 13 and 14).



Fig 13 Photograph before operation



Fig 14 Photograph after operation,

In surgery of the upper abdomen and pelvis the advantages of intubation are often very conspicuous. The respiration is shallow and the recti are completely relaxed. Expenditure of energy by the patient is reduced to a minimum and in prolonged and difficult operations, such as, gastrectomies, colectomies and hysterectomies, with severe surgical shock and loss of blood, many patients can be saved and others protected against a stormy convalescence by means of intratracheal anesthesia.



Fig 15 Shows the set up of a case for a partial Gastrectomy. The intratracheal tube with cuff has been introduced through the mouth while a stomach tube has been passed through the left nostril.

Intratracheal anesthesia is indicated in intrapleural thoracic operations where positive pressure or controlled respiration is an extra essential.

In cases of post-operative pulmonary complications, the tracheo-bronchial tree can be cleared, if necessary, by suction applied directly by means of a small catheter passed through an intratracheal tube.<sup>9</sup> The latter can be inserted either blindly through the nose or through the mouth by the direct-vision method. In the conscious patient the base of the tongue and larynx must first be anesthetised with a fine spray of cocaine solution.

Artificial respiration can be effectively given when oxygen is urgently needed.

No doubt the advantages of intubation are many but certain complications and sequelae may occur as a result of laryngoscopy or as a result of the passage of the intratracheal tube. An anesthetist who begins the use of intratracheal anesthesia will himself experience the difficulties and the injuries caused by faulty laryngoscopy. However, these can be overcome with experience, skill and ability of the anesthetist to do laryngoscopy and with his ability to anesthetise the patient to the required point of relaxation. All these injuries, such as, to the lip, teeth, soft palate and pharynx are invariably due to performing laryngoscopy in unrelaxed patients especially in patients with short, thick necks or with prominent front teeth. Some anes-

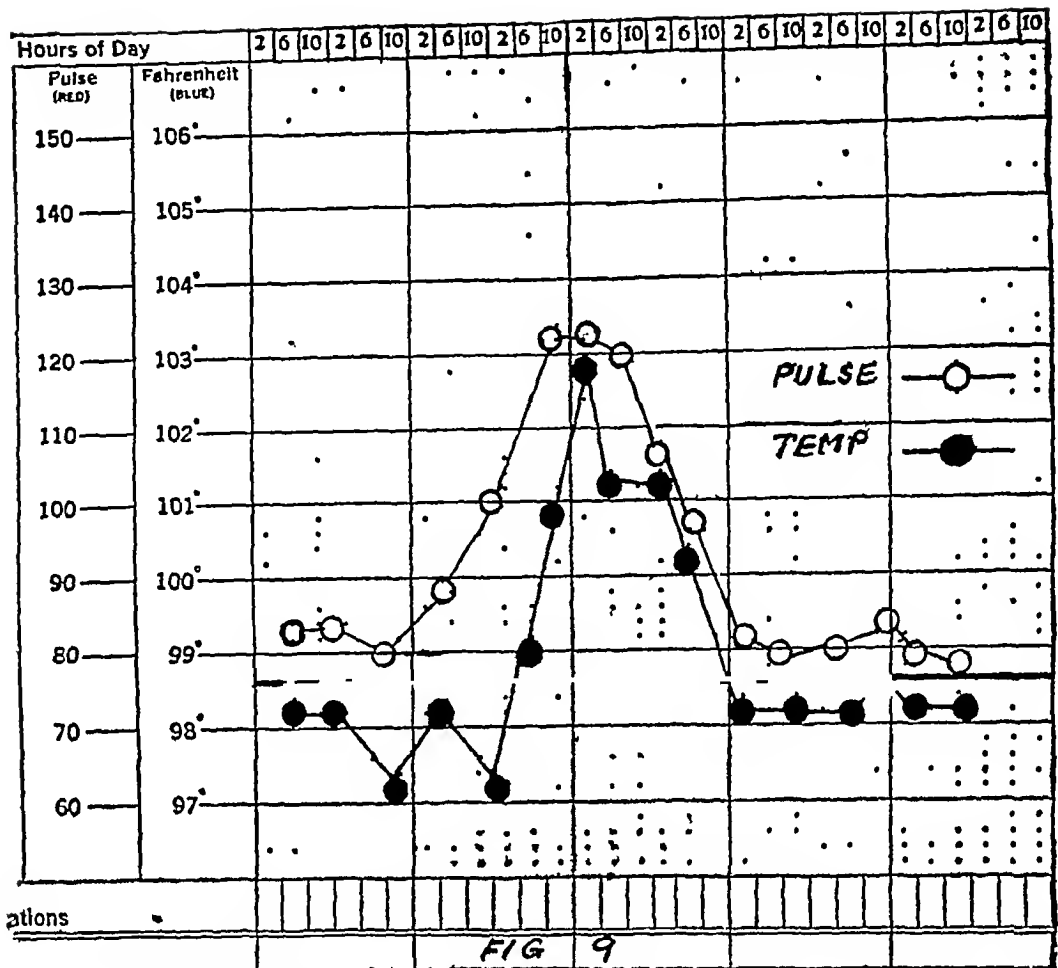


Fig 16 Shows the temperature chart of a case of collapse of base of right lung treated with tracheo-bronchial toilet only.

thetists advocate using a piece of sheet lead or a strip of strapping over the front teeth but these are usually unnecessary

Certain sequelae may occur as the result of passage of the intratracheal tube through the glottis into the trachea Granulomata of the vocal cords have been reported by Clausen and Blair Gould<sup>10</sup> Instances of laryngitis with loss of voice in some degree have been reported by Dawkins Haemorrhage may occur by trauma to the nasal passages if the tube is forced through the nostrils Table II shows the number of injuries and sequelae due to laryngoscopy and intubation in our series

TABLE II

Injuries to lip	2	Injuries to soft palate	.. 1
Injuries to teeth	2	Haemorrhage from nose	... 4

*Choice of method of intubation*—In cases where intratracheal anesthesia is desirable, both the nasal and oral routes are equally available to the

anesthetist In making his choice the anesthetist should consider all the factors and not use any particular method as a routine There are, of course, surgical and anesthetic considerations which make one method or another desirable apart from the question of sequelae For example, nasal intubation is desirable in operations in the mouth, so that the tube does not impede the surgeon The oral route is preferable when the inflatable cuff of Guedal and Waters is used

Table III shows intratracheal technique used in our series

TABLE III

Method	No. of cases
Oral without cuff	24
Oral with cuff	144
Nasal	157
Nasal blind	74
	<hr/> 400 <hr/>

The author, however, always prefers an oral intubation by "direct-vision" method to intranasal intubation unless surgical and anesthetic considerations make the latter absolutely necessary The chances of injuries and sequelae are much less if intubation is done by "the direct-vision" method in a well relaxed patient

*Anesthetic Agents*—There are available a choice of anesthetic agents sufficient for the demands of any anesthetic technique or operative procedure The agent should be selected for the patient, adapted to the technique employed and the surgical procedure anticipated

Table IV shows the various anesthetic agents used in our series

TABLE IV

Agents	No of cases
Ethyl chloride Ether Oxygen	73
Nitrous oxide Oxygen Ether	134
Cyclopropane-oxygen	88
Pentothal Sodium	90
Local anesthesia	15
	<hr/> 400 <hr/>

From the above table it will be seen that all the available anesthetic agents have been used as required by the anesthetic technique and opera-

tive procedure Wherever cautery was used, the anesthetic of choice has been Pentothal Sodium It was noticed, however, that pentothal is a difficult agent for intubation because (1) of its depressent action on respiration, (2) depth of anesthesia cannot be judged unless a stimulus is given and (3) laryngeal reflex remains when jaw is completely relaxed Local anesthesia was used in cases where tracheo-bronchial toilet was done and in cases of trismus in intra-oral surgery However, no single rule can be put down for selection of the anesthetic agent, the anesthetist should carefully select the agent or combination of agents for each patient

*Age and Sex*—Age or sex has no consideration if the surgical and anesthetic considerations need intratracheal anesthesia However, the author avoids the use of intratracheal anesthesia in aged patients who do not tolerate deep anesthesia for a long period Table V shows the incidence of age and sex in our series

TABLE V  
Age and Sex

Age	Male	Female	Total
1—19 years	...	1	2
10—19 "	...	3	8
20—29 "	...	8	22
30—39 "	...	24	98
40—49 "	...	46	142
50—59 "	.	19	89
60—69 "	...	8	32
70—80 "	..	1	7
	<hr/> 290	<hr/> 110	<hr/> 400

*Duration of Anesthesia*—Time is no contra-indication to intra-tracheal anesthesia but it is better to restrict intra-tracheal anesthesia for short anesthetics if other suitably safe methods can be used, thus avoiding deep anesthesia and the injuries and sequelae of laryngoscopy and intubation Table VI shows the duration of anesthesia with intra-tracheal technique in our series

TABLE VI  
Duration of Anesthesia

	No. of cases
Less than 15 minutes	12
15— 30 minutes	73
30— 60 minutes	51
60— 90 minutes	160
60—120 minutes	31
120—180 minutes	55
3— 4 hours	14
Over 4 hours	4
	<hr/> 400

**Postoperative Pulmonary Complications**—Postoperative pulmonary complications cannot be attributed to intratracheal anesthesia only. Various factors such as age, sex, type of operation, proper choice of medication, careful selection of anesthetic agents and technique, skillful management of the patient during the anesthetic period and adequate after-care have to be considered before intratracheal anesthesia could be blamed for post-operative pulmonary complications. However, an exhaustive survey of over 2700 intratracheal anesthetics in American clinics revealed that nasal intubation showed a higher incidence of minor respiratory sequelae than oral, while in patients with pre-existing pulmonary disease, the incidence of both major and minor complications was higher if the nasal route was adopted<sup>11</sup>. For these reasons some anesthetists prefer to use the mouth rather than the nose for intubation, unless the latter is specially indicated<sup>12</sup>.

Table VII shows the postoperative pulmonary complications in our series.

TABLE VII

**Postoperative pulmonary complications**

Bronchitis	20	Pneumonia	2
Bronchopneumonia	2	Partial collapse lung	4

**Summary and Comment**—Anesthesia by intratracheal method, its technique with advantages and disadvantages has been described. The complications attributed to passing an intratracheal tube have been unnecessarily exaggerated in the minds of medical practitioners. An attempt has been made to correct this impression and to show that almost invariably it can be accounted for by faulty technique. Certain precautions such as good relaxation of jaw, proper position of the head during laryngoscopy and skill in performing laryngoscopy, will contribute greatly towards the prevention of most complications.

I have to thank Sir Jamshedji N. Duggan, Superintendent, Tata Memorial Hospital, for giving all the facilities for my work, to Dr. V. R. Khanolkar for many valuable suggestions in the preparation of this paper and to Dr. Jal C. Paymaster and his colleagues on the surgical staff for their active and willing co-operation at all times.

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# X-RAY DIAGNOSIS OF ACUTE MASTOIDITIS

BY

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In 1905 appeared the famous book on X-Ray examination of the base of the skull by *A Schueller* wherein the author published for the first time different essential projections of the head. One of them was especially designed for the examination of the temporal bone and although more than two scores of projections have been devised since then, the projection of *Schueller* maintains its importance even to-day. Together with *Leidler* he used this projection for the examination of different diseases of the ear. Since then many other authors have occupied themselves with this problem, amidst them *Sonnenkalb*, *Lange* and *Stenvers*.

After the first world war Prof Dr *Guido Holzknecht* entrusted this subject to *E G Mayer* who invented himself an essential projection and who studied the X-Ray results in all otological diseases publishing more than a dozen papers on this subject some of them in collaboration with *L Deutsch*, *K Eisinger* and *G Politzer*. In 1930 he compiled the results of his investigations in a book which appeared at Springer, Vienna. I witnessed the development of this branch of radiology from its very inception and took active part in it, introducing it in all institutions of which I have been put in charge. In view of the great importance of this examination and of the neglect of this branch in India so far a short account on the technique and the results of the X-Ray examination in ear diseases is given below. I have chosen acute mastoiditis for this purpose as the overwhelming majority of all ear cases sent for X-Ray examination concern this disease and as the technique for the examination of the ear in cases of acute mastoiditis is by far simpler than otherwise.

The axis of the pyramid of the temporal bone is oblique to all main directions of the body, thus it will appear shortened and distorted by projection in all typical sagittal, frontal and axial pictures as used for the ordinary examination of the skull. If we bear in mind that diseases of the ear may affect the external acoustic meatus, the tympanic cavity, especially the attic, the antrum with the pneumatic system, the labyrinth, the inner acoustic meatus and its surroundings a projection would be desirable which informs us equally well about the condition of all these parts. This is technically not possible and thus the Viennese school utilises three different projections,

the projection of *Schueller* for the examination of the pneumatic system and the topography of the tegmen and the descending part of the transverse sinus, the projection of *E. G. Mayer* for the external acoustic meatus, the attic and the antrum and the projection of *Stenvers* for the labyrinth, the inner acoustic meatus and the tip of the pyramid. As our interest in cases of acute mastoiditis is usually focussed on the condition of the pneumatic system and the topography of the tegmen and the sinus, the projection of *Schueller* will suffice in all ordinary cases. But as the initial stages of mastoiditis lead often to minute changes only, a comparison with the same projection of the other (normal) side will be valuable.

Before entering into the special technique it will be necessary to devote a few words to the normal anatomy of the pneumatic system. It is regrettable that this subject has not been treated with sufficient care in books on special anatomy. Even the treatise on this subject in the handbook of *Bardleben* is not correct as the technique adopted by the author is bound to lead to false conclusions. He filled the pneumatic cells of the macerated bone with liquid metal-alloys and corroded later on the bone. This technique was not suitable to fill all the pneumatic cavities and thus the description of the author is most incomplete. Studies on the development of the pneumatic system and X-Ray examinations of the normal bone have shown that the pneumatisation starts from the antrum. From there the periantral cells, the cells in the squama, in the upper two thirds of the mastoid process and the cells occasionally to be found in the zygomatic process are formed. The base of the tympanic cavity contributes the cells in the tip of the mastoid process, the retrofacial, epibulbar and peritubar cells. The attic adds occasionally some cells in the tegmen and around and between the semicircular canals which may even continue into the tip of the pyramid. All these cells can be seen in the projection of *Schueller* which will be described now. The illustrations added to this paper are all diagrams drawn with Indian ink as the minute changes of the pneumatic system can not be seen in ordinary reproductions.

The projection of *Schueller* is made as follows. The patient lies in lateral posture. The head is slightly raised by some books so that the median-sagittal plane of the body is parallel to the table. The auricle is turned forwards so that it covers the external acoustic meatus. This is essential as otherwise the air in the concha causes a clear round spot in the X-Ray picture which can be mistaken for a destruction. The central projecting ray forms an angle of  $30^{\circ}$  with Reid's base line and leaves the skull by the external acoustic meatus of the side under examination. Thus the central projecting ray enters the skull about three fingers' breadth above the outer acoustic meatus of the opposite side but this point will slightly vary according to the configuration of the head of the patient (Fig 17). It is

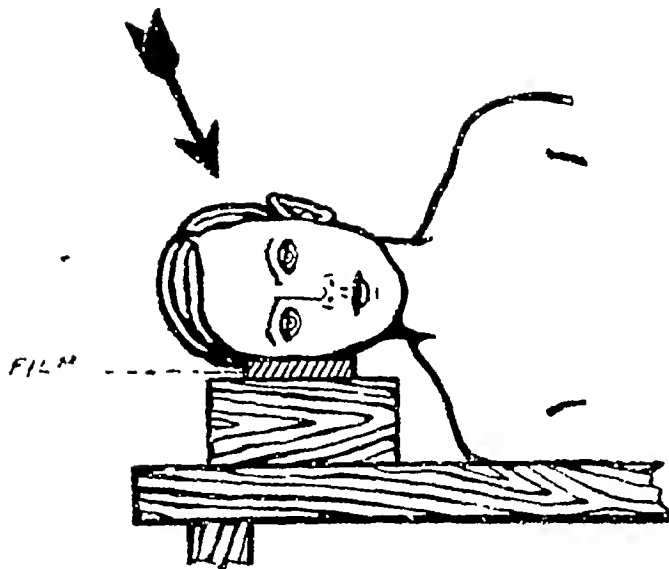


Fig 17 Posture of patient for Schueller's projection of right temporal bone The arrow indicates the direction of the central projecting ray

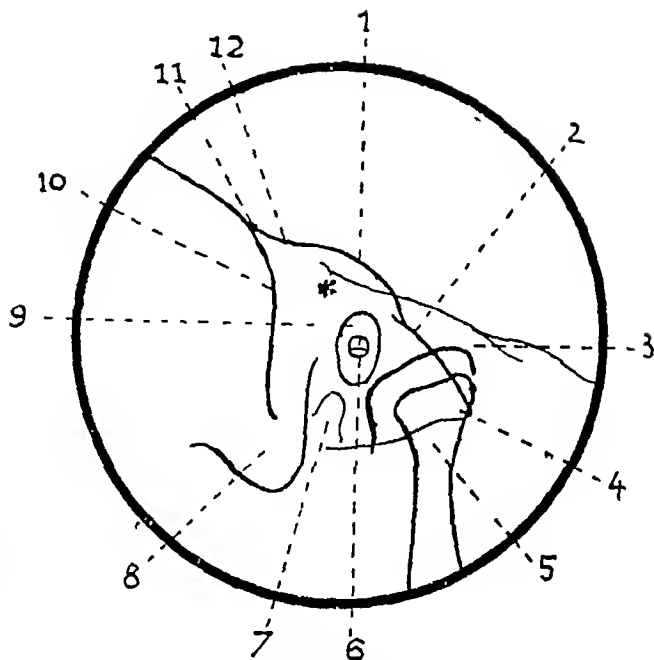


Fig 18 Diagram of Schueller's projection of a non-pneumatized temporal bone (1) eminentia arcuata, (2) superior crest of petrous bone, (3) zygomatic process of temporal bone, (4) tip of pyramid, (5) condyle of mandible, (6) internal acoustic meatus, (7) bulb of jugular vein, (8) tip of mastoid process, (9) external acoustic meatus, (10) posterior wall of pyramid, (11) Citelli-angle, (12) tegmen (tympani and antri)  
\* area of antrum.

advisable to use cones of rather small diameter (distal end about 3 inches) as the picture becomes more contrasting and distinct in this way The *Bucky-Potter* diaphragm is not very suitable for this purpose as the details of the opposite side often hinder a minute analysis

Fig 18 shows the diagram of *Schueller's* projection of the temporal bone The analysis starts best from the condyle of the mandible which is easily recognizable The mandibular fossa continues forwards into the zygomatic process of the temporal bone The dorsal wall of the mandibular fossa continues into the V-shaped tympanic bone which borders the external acoustic meatus The external acoustic meatus contains a small round circle in its centre, the internal acoustic meatus Dorsal to the external acoustic meatus the mastoid process with its tip is present The condyle of the mandible is covered by the tip of the pyramid, from there the upper crest of the petrous bone runs in oblique direction to the so-called Citelli-angle to meet here the line depicting the posterior wall of the petrous bone This line runs downwards showing a convexity towards the outer acoustic meatus It is of great importance as it corresponds in normal cases also to the anterior

border of the descending part of the transverse sinus. The upper crest of the petrous bone shows a slight elevation—the *eminentia arcuata*. The area lateral to it corresponds approximately to the tegmen tympani and antri. An asterisk marks the projection of the antrum. If it is of normal size it is hardly visible in the picture as it is covered by the dense shadow of the labyrinth. In enlarged condition, when it extends towards the Citelli-angle it is well seen, especially in non-pneumatized temporal bones.

In Fig. 18 the pneumatic system has been omitted purposely. It has been added in Fig. 19. Periantral, marginal, terminal, epibulbar, peritubar, squamosal and zygomatic cells have been indicated.

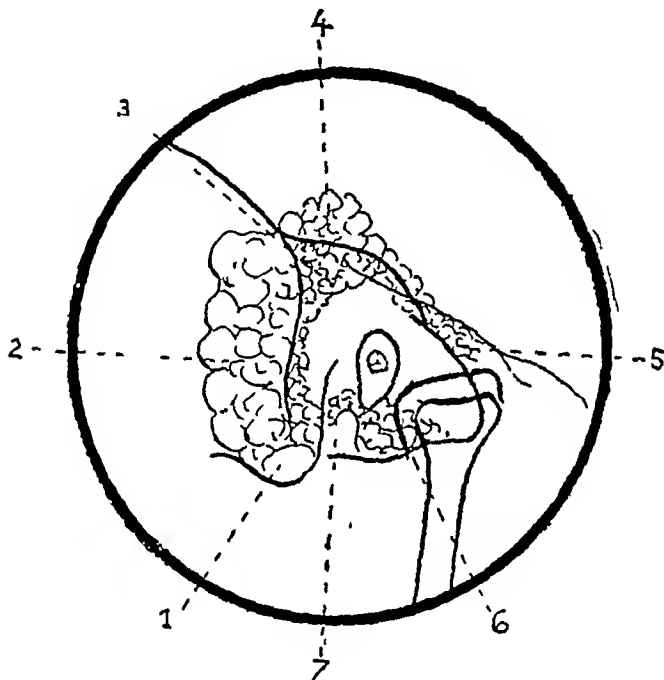


Fig. 19 Diagram of Schueller's projection of a pneumatised temporal bone  
(1) terminal, (2) terminal, marginal, (3) periantral, (4) squamosal,  
(5) zygomatic, (6) peritubar, (7) epibulbar cells

In case of mastoiditis the duties of the radiologist are threefold

- 1 He has to describe the extension and the characteristic of the pneumatic system
- 2 He has to point out essential variations of tegmen and sinus
- 3 He has to describe the normal or pathological condition of the mastoid air sinuses (cells)

ad 1 The researches of *Wittmaack* and others have shown that abnormal pneumatisation is due to hyperplasia or fibrosis of the mucosa. Thus abnormal pneumatisation found in our pictures points to abnormal condition

of mucosa and therefore to a disposition to diseases. The normal condition of the pneumatization is ascertained by four observations

a Sufficient number of cells and sufficient extension of the pneumatized area

b The boundary of the pneumatized area is arc-shaped. Deviation from this form proves that some parts of the mucosa show less pneumatizing capacity than others

c The size of the cells increases from the centre to the periphery

d The cells are not intermingled by spongy—non-pneumatized-bone

The description of the localisation and size of cells is essential for the otologist, as the operation becomes easier if it is known beforehand where cells will be found, as abnormal pneumatization is an indication for an abnormal mucosa and as special localisations of cells cause often diseases whose origin in the ear is not evident at first sight (zygomatocitis, Gradenigo's complex)

ad 2 It has been mentioned already that the line marking the superior petrous crest lateral to the eminentia arcuata corresponds to the tegmen

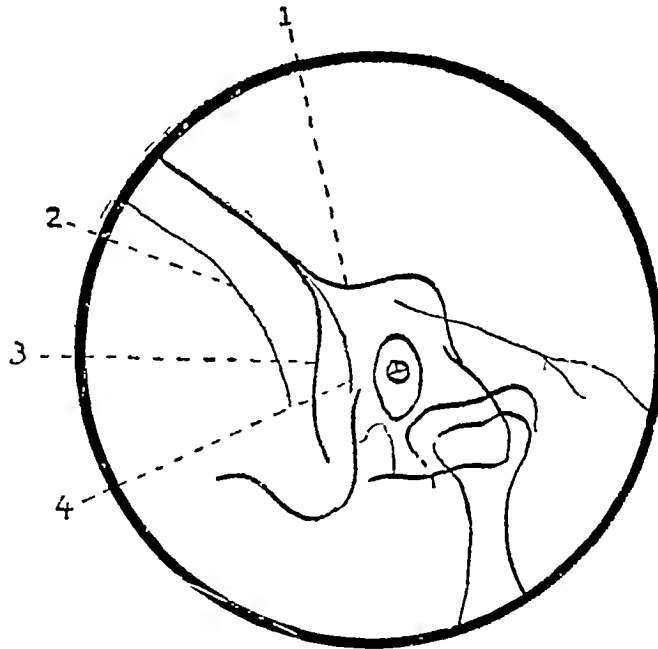


Fig 20. Diagram of Schueller's projection of a temporal bone with anteposition and lateral position of sinus and depression of tegmen. (1) depressed tegmen, (2) posterior border of sinus in lateral position, (3) posterior walls of petrous bone, (4) anterior border of sinus in anteposition.

tympani and antri. Sometimes this line is concave or an additional concave line is visible (Fig 20). This condition points to a depression of the tegmen which finding is of great importance for the technique of an operation as in these cases the dura is exposed to damage.

In Fig 18 the line corresponding to the posterior wall of the petrous bone marks at the same time the anterior border of the sinus. The distance between the sinus and the posterior wall of the external acoustic meatus is usually 14 mm. But even distances down to 10 mm are still to be considered as normal. But if the distance amounts to 7 to 10 mm only the sinus is in anteposition. Distances below 7 mm point to extreme anteposition. This decrease of the distance can either be due to an abnormal smallness of the base of the pyramid as a whole, but occasionally it is due to the fact that the sinus lies in a deep furrow of the posterior wall. This is to be seen in the X-Ray picture by the appearance of a second line ventral to that marking the posterior wall of the petrous bone (Fig 20). This line is always more concave than the dorsal one. The anterior line corresponds in cases where two lines are present to the deepest level of the furrow in which the sinus is embedded, while the posterior one depicts the posterior wall of the petrous bone. Thus in cases of the presence of two lines instead of one the distance between sinus and posterior wall of the external acoustic meatus is always to be measured from the anterior one of both lines. Anteposition of sinus wants modification of the technique of an operation and thus it is essential to be known beforehand.

Sometimes the sinus lies in a furrow of the lateral wall of the skull. This lateral position is visible in the X-Ray picture by an abnormal transparency of the area where the sinus is attached, but in some cases a second line is visible which runs in a parallel direction to the anterior wall of the sinus (Fig 20). The knowledge of this abnormality beforehand is also highly appreciated by the surgeon.

ad 3. The earliest pathological changes to be seen are opacity of the pneumatic cells. This can be ascertained especially by comparison of the normal with the diseased side. The involvement of the bone is marked by decalcification of the trabeculae or by superficial destruction of the walls of the cells or usually by a combination of both these symptoms. There is great variation in the localisation and extension of the changes. Most often the centre of the destruction lies in the mastoid process (mastoid abscess), in other cases it is round the antrum (periantral destruction) or in the zygomatic process of the temporal bone (zygomatocitis). In some cases the decalcification is a general one and the superficial destruction of the trabeculae concerns the whole pneumatic system equally (necrosis). Sometimes the walls of the cells are interrupted between the peripheric compact capsule of

the system and the trabeculae (total sequestration) In other—rather rare—cases the capsule of the compact bone separating the pneumatic system from the diploe of the non-pneumatised bone is perforated (osteomyelitis ex mastoidite)

All these changes can be easily ascertained from the projections of *Schueller* While the changes in the adult are usually quite convincing there are some difficulties in the interpretation of X-Ray pictures of children and very old patients In children the calcification of the bones is rather poor and many changes may escape observation In people of old age regressive changes of the mucosa and the pneumatic cells take place which can be mistaken as signs of inflammation

In cases of acute mastoiditis the projection of *Schueller* gives usually all the information we require Only two exceptions may be noted Rather seldom in adults (more often in children) we find periantral destruction only It has been already mentioned that the antrum and periantral cells are partially covered in the projection of *Schueller* by the dense shadow of the labyrinth For this purpose the projection of *Mayer* will furnish further essential details In rare cases the cells in the tip of the pyramid are involved This is the famous syndrome of *Gradenigo* (paresis of the abducent nerve, trigeminal neuralgia) Although these cells are visible in *Schueller's* position too (vide Fig 19), the projection of *Stenvers* is essential for the full elucidation of the case These two projections shall be described in a second article dealing with the X-Ray diagnosis of other diseases of the temporal bone in which cases these two projections are essential.

Let us finally stress the value of the X-Ray diagnosis in cases of acute mastoiditis

No 1 In cases where otoscopy is impossible (otitis externa, stenosis after burns or fractures) it is essential to settle the question whether an affection of the middle ear and the pneumatic system is present at all

No 2 In cases of mastoiditis it will inform us if the bone is already involved or not

No 3 It will facilitate the operation by beforehand information about the localisation, form and size of the pneumatic cells and about the presence of variations in the position of the tegmen and sinus

---

# MYOSITIS OSSIFICANS OR TRAUMATIC OSTEOMA IN THE REGION OF THE GLUTEAL MUSCLES

BY

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The pathology of the development of new bone in situations adjacent to, or far away from, bony structures is very interesting Leriche and Pollicard, Greig, and Watson Jones have tried and explained the development of this bone in peculiar situations



Fig 21 Illustrates the condition of the hip at the time of admission Shows the attitude of the patient while standing up

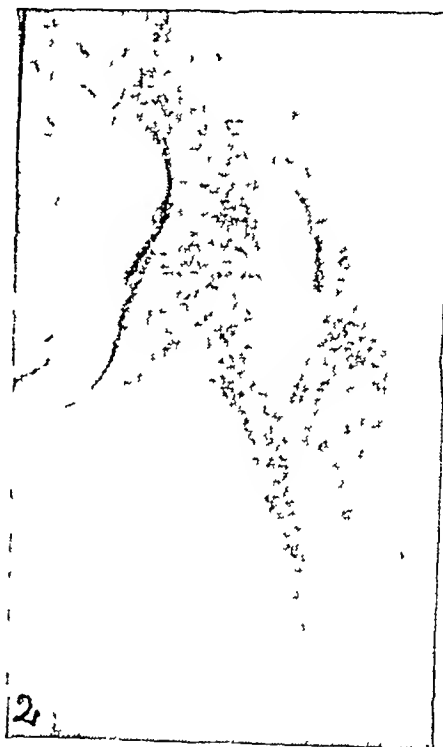


Fig 22 Radiogram showing the traumatic osteoma in its full development Also note the osteo-arthritic changes that have occurred round about the head of the Femur especially in its inferior aspect

Leriche stated that the Osteoblast had no specific bone-forming function, that it was merely a mesenchymatous cell in which inorganic salts may be deposited, absorbed, redeposited and reabsorbed under the local influence of the Enzymes and the general control of the Endocrines Traumatic Osteoma

in the neighbourhood of bones or joints can only be explained by the conversion of the haemorrhagic clot—result of tear of muscles and periosteum—into the plastic granulation tissue and later into the pre-osseous substance in which inorganic salts are deposited ultimately to be converted into bone depending upon the physico-chemical reaction and the Enzymes Traumatic Osteoma is commonly found in the region of the elbow and was usually the result of bad treatment (KINI)

Very few cases are described in the region of the hip Watson Jones has described and has shown a picture in his book of a traumatic osteoma, result of a dislocation of the hip The following case illustrates a remarkable case of traumatic osteoma occurring in the region of the hip joint

A Hindu male, aged 27 years, fell on his left hip while ploughing his field He became unconscious for an hour After regaining consciousness he found that there was remarkable swelling in the region of the left hip for which he was treated first by indigenous methods and later in a district headquarters hospital He was admitted under the author's care for inability to walk and for pain in the left hip three months (?) after the accident It was found that the movements at the hip were remarkably limited and

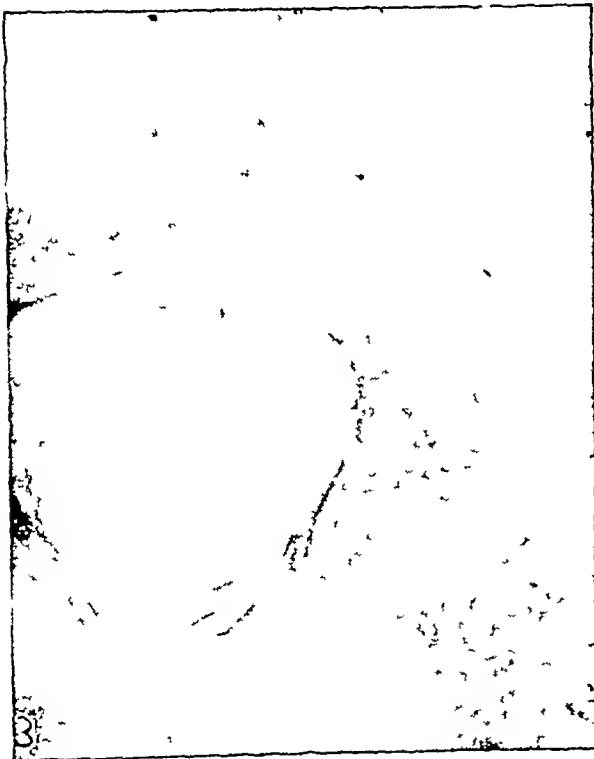


Fig 23. Shows the result of the operation



Fig 24 Illustrates the amount of flexion that was possible at the time of discharge from the hospital.

there was pain on movement. On inspection, the gluteal muscles were found wasted. There was no shortening of the limb. On palpation, a hard bony mass was found to extend from the tip of the great Trochanter to the crest of the Ilium. X-ray examination showed a big dense Osteoma arising deep to the gluteal muscles and extending right up to the crest of the Ilium. The hip joint showed osteo-arthritic changes. He was operated on under spinal anaesthesia. After splitting the gluteus maximus muscle, the Trochanter with the attached muscles including the Gluteus Medius was chiselled off and a big osteoma was removed with difficulty, the Trochanter was re-sutured to the Femur and the limb was put in a Plaster of Paris spica bandage. The patient made an uneventful recovery and has gone back to work. The movements at the hip are shown in Fig 24.

### Points of Interest

- 1 A big dense traumatic osteoma after injury to the hip is described.
- 2 The actual nature of the injury was difficult to obtain, as the patient was unable to describe the incident being a villager.

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-

# SARCOMAS OF THE BREAST

BY

CAPT M G KINI, M C, M B, M CH (ORTH), F.R.C.S.E., F.R.S.E.,  
SURGEON AND SUPERINTENDENT, STANLEY HOSPITAL, MADRAS.

Tumours of the breast are common and various types have been seen by the author. The most common types are epithelial tumours which undergo a malignant change and benign tumours of the fibro-adenomatous type. Sarcomas of the breast are rare and when they do occur, it is stated that they are intensely malignant. Of the 121 tumours of the breast seen and operated on by the author from 1932 to date, three were cases of sarcomas of the breast. The case histories of these tumours are as follows —

(1) A Hindu female, aged 50 years, was admitted for a growth in the left breast in 1934. Four years before admission, she saw a small globular growth in the upper and inner quadrant of the left breast. This small growth began to grow till it reached the size shown in the picture taken at the time of admission (Fig 25). On examination a knob like projection was seen in the upper part above the left nipple. Both nipples were at the same level. On palpation, the tumour was not adherent to the skin and was freely moveable and was irregularly globular and firm in consistency to the feel.

A complete excision of the breast was done including the pectoral muscles and fascia with the gland bearing area, followed later by radiation with radium (Fig 26). She had 7488 mgm hours of radiation. The method

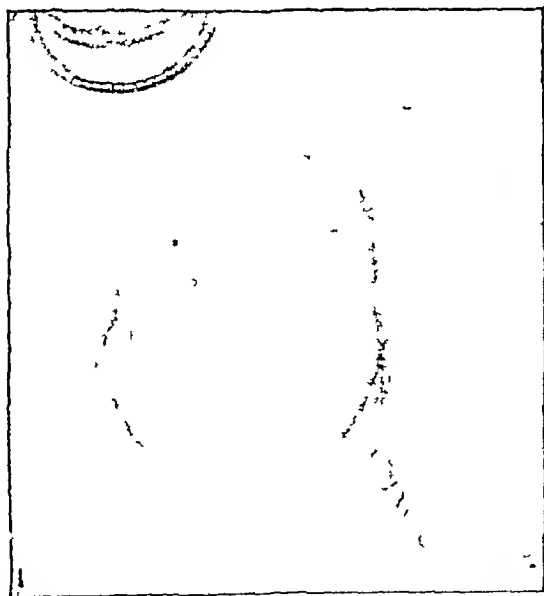


Fig 25 Case I Clinical photograph of the tumour in the left breast.



Fig 26 Case I Illustrates the result after complete excision of breast.

of implantation was used with a view to barrage the area and kill the malignant cells if left behind. The tumour on removal showed a fleshy growth with cystic degeneration in one part of it (Fig 27). On histo-pathological examination it was found to be a sarcoma of the breast (Fig 28). The case has been followed up to date and the patient is keeping good health with no recurrence and spread of the disease.



Fig 27 Case I Clinical photograph of the specimen removed

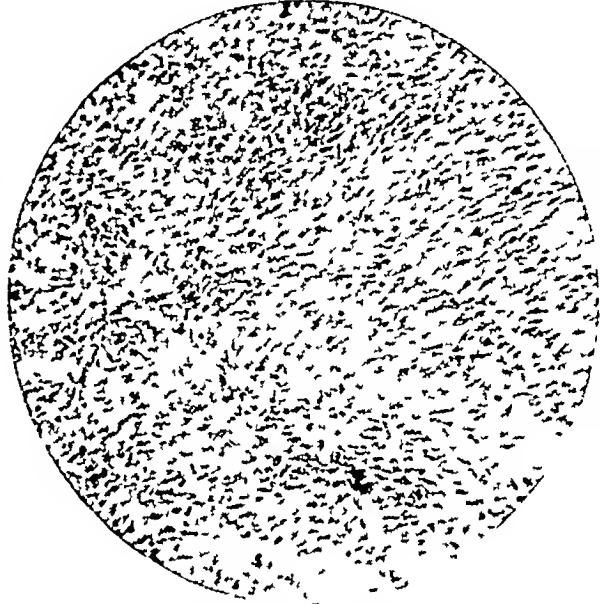


Fig 28 Case I Histo-pathological section showing the spindle celled sarcomatous tumour

(2) A Hindu female, aged 50 years, was admitted on 10-6-1938 for a recurrent tumour in the left breast with a duration of one year. She was married and had one child. Nine years before admission she was operated on in a Gosha Hospital in the mofussal area on the same breast but exact details were difficult to obtain. In 1937 she was operated on again for a similar swelling on the same breast. The swelling recurred within a month or so. It gradually increased to the size shown in Fig 29 with an ulceration of about 2" in diameter at the inferior aspect of the old operation wound. She was a well nourished individual aged 50 years, she was not anaemic, not jaundiced, tongue was clean and moist, teeth were clean and normal and there was no oedema of any part of the body. On admission a swelling of the size of a pumpkin with dilated veins was found. An ulcer 2" in diameter in the antero-inferior part of the old incision was found. No enlarged glands were felt. A complete amputation of the breast was done on 23-6-1938 and the wound healed by first intention.

*Pathological Report.*—A cellular-fibromatous structure undergoing malignancy

In reply to a letter written to her in 1940 she stated that she was keeping good health There is no reply to a letter written in June 1943

(3) A Hindu female, aged 50 years, was admitted on 26-9-1938 for a swelling on the right breast which had recurred after operation Duration six months In July 1938 she noticed a small swelling about the size of a lime in the lower half of the right breast The swelling grew slowly in size to that of a small sized orange by January 1938 The swelling was hard and painless She was operated on outside for that swelling but it recurred in two months time to the size shown in the picture (Fig 30) The skin was slightly tense over the swelling

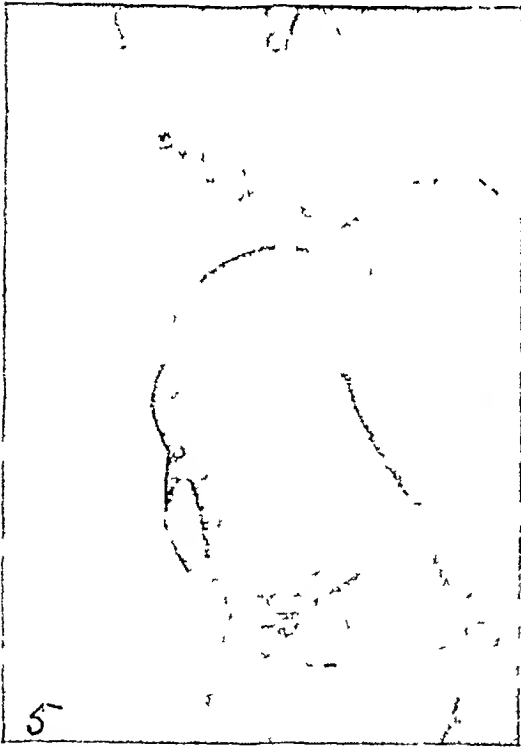


Fig 29 Case II Recurrent Tumour  
Note the size



Fig 30 Case III Clinical Photograph of the  
recurrent tumour of the breast

On palpation it was nodular and was of the size of a big orange It was hard and not cystic The skin over it was not attached to it except over the most prominent part of the swelling and in the region of the scar The edges were well defined and circumscribed The lump was not attached to the Pectoral muscles and was freely moveable in every direction The left breast was normal No glands were palpable and there was no evidence of secondaries anywhere

On 14-10-1938 she was operated on under general anaesthesia and a complete excision of the breast was done. The glands were seen enlarged at operation though they could not be palpated clinically. Pathological section of glands showed no secondary infiltration. Pathological report of the breast stated that it was a case of malignant tumour of the breast. "The stroma has taken on malignant activity and resembled somewhat that of a spindle cell sarcoma. There are other areas where the epithelium is also proliferating, it must be regarded as highly malignant."

On following up the case it has been reported that she was all right in October 1941 but that she died on 28-11-1941 and in the words of her relative "she collapsed and died of a paralysis shock."

### Points of Interest

1 Sarcomas of the breast are rare tumours and three cases are described. All the three were found in the 5th decade.

2 Of the three, one was a primary tumour and two were recurrent tumours of the breast. A complete excision was done in the case of the primary tumour and on follow up from 1934 to date she is reported to be keeping fit (Case No 1). The second of the two recurrent tumours replied to a letter written in 1940 stating that she is keeping good health, no reply has been received to a letter written in June 1943. The other case of the two recurrent tumours lived three years after operation and died of heart failure and paralysis. Is it due to secondaries in the brain and skull? (Case No. 3)

3 It is interesting to note that where an excision and complete amputation of the breast which proved sarcomatous on histological examination was done followed by radiation, the patient has lived for a long time. Of the two recurrent tumours one has died after three years. Is this due to the partial operation in the first instance? The other follow up is not complete.

4 Is the prognosis better as illustrated by case No 1 if complete operative removal is followed by radiation?

---

# A CASE OF CANCELLOUS OSTEOMA OF THE FLEXOR TENDON SHEATH OF THE LEFT RING FINGER

BY

MAJOR D R BHARUCHA, FRCS, I A M C,

O C, SURGICAL DIVISION I G H (I T)

G N, a young man of twenty-one was admitted to the hospital for right indirect inguinal hernia. In the course of a routine examination a hard tumour was found in the palm of the left hand. The patient volunteered the information that it was present for the last sixteen years.

The swelling was situated over the left fourth metacarpal bone and about two by two inches. It was bony hard, irregular, quite painless and not attached either to the skin or the deeper structures. The left epitrochlear and axillary lymph glands were normal. The movements of the fingers and the left wrist joint were not affected in the least. X-ray pictures in two planes showed a cancellous exostosis but it was not quite clear from them whether it was attached to the bone or not.

Under general anaesthesia an incision about three inches in length was made over the centre of the swelling in the palm. The tendons of the flexor



Fig 31 Shows clearly the shape and irregularity of the tumour. The groove in front contained the tendons of the Flexor Digitorum Sublimis and Profundus of the ring finger.



Fig 32 X ray of the left hand showing the cancellous nature of the tumour.

digitorum sublimis and flexor digitorum profundus going to the left ring finger were seen to lie in one of the grooves of the osteoma. These were displaced easily out of the groove and immediately the osteoma was freed and was shelled out without any difficulty. It was noted at the operation that the tumour had no bony attachment whatsoever. As a matter of fact the fourth left metacarpal was not seen during any stage of the operation. There was very little bleeding and the wound was closed by interrupted sutures without drainage. The right inguinal hernia operation was done immediately afterwards.



Fig 33 Micro-photograph of the tumour under low magnification. Shows well formed Haversian systems. No cartilaginous tissue is seen.



Fig 34 Micro-photograph of the same under high magnification.

Convalescence was uneventful and from the fourth day finger movements were started. On the tenth day when the sutures were removed they were quite free and of full range.

*Pathological Report*—Macroscopically the tumour was very irregular, very hard, and with no cartilage over its surface which was unbroken throughout. It was found to be of cancellous bony structure on section and no cartilage was found within. A microscopic examination revealed well formed bone with Haversian systems.

An X-ray taken after the operation showed that all the left metacarpals were perfectly normal and without any irregularity

My thanks are due to Major Lucas, R A M C , for the microscopic examination and report and to Lt-Col E P N M Early, I A M C for permission to record this case

In the British Journal of Surgery of October, 1942, Surgeon Lt -Com J A Shepherd, R N V R has published a case of an Osteochondroma arising from the tendon sheath of an index finger

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# A CASE OF SPONTANEOUS RUPTURE OF A MESENTERIC CYST

BY

MAJOR D R BHARUCHA, FRCS, I A M C,

O C, SURGICAL DIVISION I G H (I T)

S R, a young cook of twenty-five years was admitted to the hospital on 29-4-'43 with acute pain in the abdomen, more marked in the epigastrium, and a history of absolute constipation for the past six days

The patient stated that he had a lump three inches by three inches in the epigastrium for the last one month. The lump was slightly painful and tender. Twenty-four hours before admission the pain increased suddenly, starting in the epigastrium and spreading rapidly all over the abdomen. There was no history of trauma.

On examination the abdomen was seen not to be moving well with respiration. There was no distension and no visible peristalsis, no lump could be felt. The abdominal wall was rigid all over but more so in the epigastrium. Free fluid and liver dullness were present. On auscultation of the abdomen no peristaltic sounds were heard. A rectal examination revealed nothing of importance. All the hernial orifices were normal. Two soap and water enemata given at half hour intervals showed that there was no absolute constipation. Blood, WBC count 18,750, polymorphs 93%, lymphocytes 1%, mononuclears and eosinophils 3%, no MP seen. Urine, alkaline, no sugar or albumin present but triple phosphate crystals seen.

A provisional diagnosis of a very minute rupture of a peptic ulcer was made and the patient prepared for operation. On 29-4-'43 under general intratracheal anaesthesia the abdomen was opened by a right paramedian incision. About two pints of golden yellow serous fluid was found free in the peritoneal cavity. No pus was found. A few small spots of fat necrosis were present over the greater omentum and the transverse meso-colon. No perforation of the stomach, duodenum or gall bladder was detected. All the other abdominal viscera were normal. At the root of the transverse meso-colon and the upper part of the mesentery of the small intestine a cystic space was seen containing fluid similar to that found free in the peritoneal cavity. It was pouring out of a small rent. All the fluid was mopped up and the opening in the cyst wall enlarged. The cyst was overlying part of the head of the pancreas and the junction of the second and third parts of the duodenum which could be easily seen. The cyst was not communicating with the cavity of the lesser peritoneal sac as was noticed when the index finger

of the left hand was passed through the Foramen of Winslow and that of the right into the cyst. Marsupialization could not be done. A large rubber drainage tube was placed in the cyst and packed round firmly with roller gauze. A suprapubic drainage was also placed and the abdomen closed in layers.

Apart from collapse of the left lung which developed on the second day and which was successfully treated by breathing exercises, alkalies, and sulphapyridine, the convalescence was uneventful. Both tubes were removed on the fourth day and the sutures on the tenth. At present the patient is quite fit.

I wish to thank Lt-Col E P N M Early, I A M C, O C—I G.H for permission to publish this case.

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## Association Notes

The Fifth Annual General Meeting of the Association of Surgeons of India is being held at Hyderabad (Deccan) on the 28th, 29th and 30th December, 1943. The elections for the Governing Body have been held and the counting of the votes will take place before the Annual General Meeting. The following subjects will be taken up for discussion —

- 1 Laryngeal Carcinoma by Dr H D Gandhi and Dr S G Joshi, Bombay
- 2 Injuries of the Thorax by Dr C S Patel, Bombay
- 3 Surgery of the Gall Bladder by Dr P Chatterjee, Calcutta

### SUBJECTS FOR DISCUSSION FOR LATER MEETINGS

#### 6th Meeting

- 1 Traumatic Surgery of the Skull by Dr R N Cooper, Bombay
- 2 Carcinoma of the Breast by Dr N C Joshi, Delhi.
- 3 Urinary Lithiasis by Dr L B Joshi, Karachi

#### 7th Meeting

1. Carcinoma of the Rectum by Dr C P V Menon, Madras
- 2 Enlarged Prostate by Dr S R Moolgavkar, Bombay
- 3 Fractures of the neck of the Femur by Dr B N Sinha, Lucknow

#### 8th Meeting

1. Carcinoma of the Cheek by Dr B M Joly, Delhi.
- 2 Tuberculous disease of the Spine by Dr S P Srivastava, Agra.
- 3 Hare Lip and Cleft Palate by Dr S C Sinha, Calcutta

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# THE INDIAN JOURNAL OF SURGERY

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MARCH 1944

No 1

## OPERATION FOR ENTROPION

पक्ष्मरोधे प्रवृद्धेषु शुद्धदेहस्य रोमसु ।  
उत्सृज्य द्वौ भ्रुवोष्ताद्भागौ भागं च पक्ष्मतः ॥ ३४ ॥  
यवमात्रं यवाकारं तिर्यक् छित्वाद्वाससा ।  
अपनेयमसृक् तस्मिन्नल्पीभवति शोणिते ॥ ३५ ॥  
सीव्येत्कुटिलया सूच्या मुद्गमात्रान्तरैः पदैः ।  
बद्ध्वा ललाटे पट्टं च तत्र सीवनसूत्रकम् ॥ ३६ ॥  
नातिगाढश्लथं सूच्या निक्षिपेदथ योजयेत् ।  
मधुसर्पिकवलिकां न चास्मिन् बन्धमाचरेत् ॥ ३७ ॥  
न्यग्रोधादिकषायैश्च सक्षीरैस्तेचयेद्भुजि ।  
पञ्चमे दिवसे सूत्रमपनीयावचूर्णयेत् ॥ ३८ ॥  
गैरिकेण व्रण युज्यात्तीक्ष्णं नस्याञ्जनादि च ।

ASHTANGA HRIDAYA UTHARA STHANA  
Chapter, IX

*When eyelashes are exuberant and irritate the eyeball the following operation may be done. The patient should have been previously cleansed, both externally and internally. Make an incision in the shape of a barley grain (elliptic) and of the same length, one third of the way from the lash to the eyebrow. Wipe off any blood with a clean wet piece of cloth. As the bleeding stops stitch the wound, using a curved needle and spacing the stitches the length of a green gram. Tie a pad over the forehead and fix the thread from the suture to this, with the needle, pulling the thread not too tight nor letting it sag. Spread a cloth dipped in a mixture of honey and ghee, over the parts. No bandage should be used.*

*If there is pain add some milk to a decoction of "Nyagrodhad Gana" and allow a thin steady stream of the lotion to fall over the wound for some time. Remove the sutures on the fifth day and apply finely powdered "Garrika"—(Saffron earth, also known as red chalk). Use potent nose and eye washes.*

# EXPERIENCES WITH PATHOLOGICAL CONDITIONS OF THE GALL BLADDER

BY

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There seems to be a general belief among medical men that gall bladder diseases are very rare, and that they are all of a very serious nature, and that cholecystitis could not be present apart from severe pain or the presence of biliary calculi. Another common belief is that the sufferers from gall bladder disease are mostly females, and students used to, (and sometimes even now), quote the century old adage 'fair, fat, forty, female and fertile,' whenever the ætiological factors of cholecystitis were asked, at the same time saying that all these factors began with the letter 'F'. I remember telling one student when he mentioned these ætiological factors, that the ætiology of these factors themselves could be comprised in one word which also began with a big 'F' and that word was 'Foolish'. In fact my experience is that cholecystitis is an extremely common disease, all the cholecystitis cases are not of a serious nature, pain is not at all an important symptom of the disease, biliary calculi are rare at least in this part of India, that it is more common in men than women, and lastly the patients are in the vast majority of cases more inclined to be lean than fat. Moreover I need hardly say that the description 'fair' could be applied to very few cases of cholecystitis that passed through my hands.

Herein I am giving the observations that I made in about 150 cases, out of which about 98 were operated upon.

As stated above cholecystitis is a very common disease, but as in the majority of cases it runs a chronic and mild course, and as the symptoms closely simulate diseases of other abdominal viscera, the gall bladder is the last organ to be thought of in abdominal conditions. But all the same one finds that although mild, it follows a persistent course and in the long run does irreparable damage to the other systems in the body, especially the cardio-vascular system and the digestive system.

Says the Hungarian doctor Forai Hurst, in his book 'Inter-relation of Abdominal Disease' — "There has been in the past too much tendency to regard the many disorders of the abdominal viscera as isolated phenomena. Derangements of one has far-reaching effects on the others. The fact that an appendicectomy scar is one of the commonest physical signs of chronic chole-

cystitis, is not so much an indication that a wrong diagnosis has been made in the past instance as that the case has been judged from a too narrow point of view"

### Etiology and Pathology of Cholecystitis

Says Warren Cole, "There is scarcely any other disease than cholecystitis in which relationship between the pathological findings and amount of symptoms is so variable and inconstant" According to C A Kunath, "A disturbing factor is the relatively high percentage of cures in the group of patients with normal or nearly normal gall bladders Many patients get relief from symptoms after removal of a gall bladder showing very little pathological change It appears that while histological changes may be nil or slight, functional or physiological disturbances of the gall bladder which in no way produce any anatomical changes can be present Therefore a pathological report can offer no accurate index as to the possible benefit that may result from cholecystectomy 73 per cent of patients with normal cholecystograms were cured by operation. Cholecystography cannot be relied upon either for diagnosis or prognostic purposes following cholecystectomy, but preoperative symptoms are of great value"

Pathological conditions of the gall bladder that have any surgical significance are intramural, and the avenues of infection are mainly through the vascular and lymphatic systems Ascending infection by involvement of the mucous membrane going through the duodenum and bile ducts is not very common Streptococcus, staphylococcus, B coli, and B typhosus, have been found in cultures made from the bile in cholecystitis The specific streptococcus thus found, when injected into bile, does not give rise to cholecystitis but when injected into the blood or intramurally into the gall bladder gives rise to cholecystitis within a couple of months This shows that the infection in cholecystitis is carried through blood, and the gall bladder being a very vascular organ the pathological changes are essentially intramural Another important avenue of infection is the liver which, being primarily infected, carries the infection through blood vessels, by lymphatics, and by direct contact to the walls of the gall bladder The liver, in addition to producing digestive secretion, is the organ through which most of the products of digestion pass before reaching the tissues of the body All the blood in the gastrointestinal tract, spleen, and pancreas except the small amount that drains through the collateral channels passes through the liver The portal circulation therefore is of considerable importance in relationship to the development of pathological conditions in the gastro-intestinal tract and the liver An acute or chronic pathological condition of the gastro-intestinal tract may cause infection of the liver cells, which carry the infection to the gall bladder

Thus typhoid, dysentery, chronic gastritis, appendicitis, and colitis may play an important role in the ætiology of cholecystitis

Westphal describes a special pathological condition which he has named 'Biliary Dyskinesia'. He classifies dyskinesia patients into two types (1) Cases in which the vagus is over-sensitive (parasympathetic predominance), resulting in hypersensitivity with rapid emptying of the gall bladder accompanied by spasm of the ampulla of Vater (2) Cases in which the vagus is under-sensitive (sympathetic predominance) creating atony of the gall bladder and ampulla with spasm of the sphincter of Oddi. However, in each type the final important disturbance is blockage of bile flow. The stimulus reaches the vagus in such cases in its peripheral portion, its centre in the medulla, the midbrain, and also the interbrain. The irritation to the vagus may be caused by extrinsic poisons such as nicotine, etc., intrinsic poisons such as chronically infected appendix, or the vegetative impulses which are easily affected by psychological influences in people with a neurotic temperament. An allergic condition due to idiosyncrasy for certain kind of articles of diet may also be responsible for this condition.

Up till a few years ago importance was given to a condition of the gall bladder called 'Cholesterosis' or 'Straw-berry gall bladder,' in which the mucous membrane of the organ is rough and red like that of straw-berry due to deposit of cholesterine crystals. But the general opinion now is that cholesterosis has very little to do with the production of manifestations attributable to diseases of the gall bladder.

According to Wolfler, with a low grade stasis in biliary passages such as may be produced by disturbed papillary function or by complete or incomplete obstruction of the duodenal end of the biliary or pancreatic ducts, the bile mixed with pancreatic juice may remain in the ducts, for a considerable time, the bile-pancreatic juice ratio may be altered, and variable amounts of pancreatic juice may enter the gall bladder. If the pancreatic content be higher it may give rise to pathological changes in the bile ducts and the gall bladder.

Out of about 150 cases that came under observation for symptoms of gall bladder trouble, or were suspected to have gall bladder trouble, about 25 per cent gave a history of having suffered from an attack of typhoid fever, about 10 per cent gave a history of dysentery, about 10 per cent were alcoholics, and in 5 per cent of cases associated diseases of the appendix or duodenal ulcer was found. But in the majority of cases there was a history of irregularities in the habits of life, as regards time and quality of diet, etc. Psychic factors such as mental worries, etc., connected with the struggle for

existence, congenital factors such as an abnormal blood vessel or narrow bile ducts were found in a few cases

Out of the 98 cases that were operated upon, the commonest pathological changes found at operation were, a slightly enlarged gall bladder with the colour of its coat changed from slate blue to pale yellowish brown or muddy red, and the serous coat very adherent and containing a large amount of fat. Fibrous adhesions covered the whole organ but they were most marked near the cystic duct. Enlarged glands about two or three in number were always present (Lund's sentinel glands) at the junction of the cystic duct and the common bile duct. In three cases the coat of the gall bladder had degenerated to papery consistency. In about six cases containing thick bile with or without stones, the gall bladder was found to be atrophied having a very thick fibrosed wall with practically no serous coat. One gall bladder had a wart-like growth on its wall externally. In about ten cases the common bile duct was appreciably dilated (in three cases to the size of the duodenum) with a pathological gall bladder. In one case the gall bladder was pale muddy and small but fully distended and firmly adherent to the duodenal wall and this gave rise to an extensive tear in the duodenal wall when trying to separate it. In one case there was a carcinomatous growth in the gall bladder and in another the gall bladder was dilated due to carcinoma of the head of the pancreas. In one case the gall bladder was enormously dilated to the size of a brinjal and was accompanied by multiple abscesses in the liver.

There seems to be a very close connection between the pathological condition of the gall bladder and the heart. According to Laird, thrombosis of the coronary arteries occurred in 12 per cent of cholecystitis cases. Cholecystectomy cured 78 per cent of cases with gall bladder symptoms. Presence of heart conditions in patients with gall bladder disease does not constitute contraindication for cholecystectomy. Laird is of opinion that gall bladder disease is a definite ætiological factor in myocardial lesions.

Gall bladder disease produces abnormal T wave changes in the electrocardiograms. After removal of the diseased gall bladder the electrocardiogram can become normal. There is a co-relation between the clinical and pathological severity of the gall bladder disease and the electro-cardiographic abnormalities.

Recently Gilbert and his associates have published an important contribution in this field. They have shown that there is a decrease in the coronary blood flow upon distension or irritation of the biliary ducts. Gilbert has called attention to the fact that both clinical and experimental evidence indicates that stimuli originating in the gall bladder may cause a decrease in

the coronary blood flow which results in a disproportion between blood supply and blood needs, similar to that which occurs when intrinsic anatomic changes are present in the vessel walls. In the one instance pain is the result of the spasm induced by extrinsic autonomic stimuli, in the other the disproportion becomes evident when additional demands are made upon the restricted supply of blood in the coronary vessels.

In good many of the cases the lesion was found more in the cystic duct than in the fundus of the gall bladder. Usually the duct was narrowed down by being covered with thick adhesions. In about six or seven cases the duct looked extremely narrow. In two cases the common bile duct was found to be very much narrowed uniformly, most probably a congenital defect. In some of these cases when the fundus of the removed gall bladder showed very little, if any, evidence of disease, the pathological changes observed in the cystic duct were sufficient to explain the gall bladder symptoms. Most of these lesions in the cystic duct were of the type capable of producing obstruction of the duct. Many such lesions cannot be identified until after cholecystectomy when the cystic duct can be opened. If the symptoms are caused by the lesions of the cystic duct cholecystectomy will relieve the patient. However, in one type of biliary dyskinesia such a procedure is not likely to alleviate the symptoms. The obstructions of the cystic duct are described under the following eight heads — (1) Stenosis due to extrinsic adhesions (2) Stenosis due to thickened wall (3) Congenital or inflammatory lesions involving the valves of Heister (4) Congenital or inflammatory twists or kinks (5) Stones in the ducts (6) Tension induced by an enlarged liver (7) Compression due to tumour or lymph nodes (8) Obstruction due to anomalous hepatic or cystic artery.

### Clinical Features

*Acute cases*—About 25 patients were admitted with symptoms of acute cholecystitis. The symptoms were nearly like those of acute appendicitis, but subjective symptoms were much less severe than in appendicitis. Only about eight of these consented to get operated. In one case only was immediate operation done. It was a case of perforated ulcerating gall bladder. The others were operated on after the acute symptoms had subsided. One patient who was not operated upon had three more attacks of cholecystitis with jaundice, later on developed a cirrhotic condition of the liver and died of phthisis after ten years. Another patient who refused operation when seen about eight years later for another complaint, was found to be in an advanced state of emaciation due to deficient nutrition, most probably due to deranged liver function from persistent gall bladder trouble. The majority of the other patients who refused operation could not be traced.

In all these acute cases pain was the most marked clinical symptom present over the whole abdomen but most marked over the right side. Radiation was toward the right subcostal region and angle of the scapula. Vomiting was not present as a rule. Shock was less severe and symptoms subsided more quickly than in acute appendicitis, and the pain and tenderness became localised to the right hypochondrium. In three of these acute cases the patients were being treated for heart disease for some time before they were admitted.

In chronic cases there was more of distress than pain of which the patients complained. Pain when present was usually of a dull character and appeared soon after food, was relieved by vomiting, or after the stomach was empty. In advanced or long standing cases it was usually continuous. It was most marked in the right hypochondrium and radiated to the epigastrium, right subcostal region and angle of the right scapula. Nearly every patient complained of heaviness and distension of the stomach after meals. About 35 patients complained of persistent pain with slight tenderness in the lower abdomen, about one inch below and to the left of the umbilicus. I am inclined to think that this is a common symptom in chronic gall bladder disease, although I have not been able to account for it. An old woman who was later on found to have stones in the gall bladder, was admitted for no other symptoms but persistent pain in that area. One patient who gave history of hunger pain with clock-work-like regularity was found to have stones in the gall bladder. A few cases of chronic cholecystitis do give histories of hunger pain, but the clock-work-like regularity of duodenal ulcer is extremely rare. Pain in the right shoulder was rarely complained of and was never found to be a characteristic symptom. History of previous attacks of jaundice was given by very few patients.

Westphal's *syndrome* has been found to be very valuable in diagnosing cholecystitis from diseases of other organs in the abdominal cavity. The examining surgeon should place the thumb of his left hand between the sterno-cleido-mastoid and the scalenus anticus muscles on the patient's right and press it toward the larynx and the vertebral column, with the forefingers resting on the back of the neck. If the result is positive the patient complains of acute pain which may radiate downward. Individual patients feel the same pain if they spontaneously turn the head quickly. For the sake of comparison the same test should be made on the left side also. The phenomenon should be regarded as positive if it is markedly stronger on the right side. The phrenic includes sensory branches which run from Glisson's capsule and the bile passages to the coeliac and phrenic ganglia. It is therefore a case of viscerosensory pain reflex resulting from a tension of Glisson's capsule. The test is conclusive only if it is positive and diseases

of the diaphragm and the thoracic cavity should be excluded. Absence of the phenomenon proves nothing. Moreover it should be tried in intelligent patients only.

In a few chronic cases pain of a severe colicky type was present. In one of these cases the gall bladder was found to be slightly enlarged, pale red in colour and covered with fibrous adhesions. In the second case there was slight ptosis of the gall bladder with enlargement and the cystic duct was very much narrowed. In the third case, a very chronic one, the gall bladder was fibrous, and very much atrophied and there was an abnormal branch from the hepatic artery passing through the wall of the gall bladder and reaching the right lobe of the liver. In only one chronic case severe colicky type of pain was complained of in the left hypochondrium. It became much less after cholecystectomy but took one year to completely disappear. Dr Charles Mixter says, "Left sided pain in biliary tract disease is usually explained by pancreatitis or extension of pericholecystic disease to the left side, without extension of the inflammatory process. On embryological grounds the common duct must be assumed to have a bilateral innervation. This would explain the occurrence of left sided pain."

Cholecystitis may have many symptoms in common with the following diseases and the points in differential diagnosis are given below —

(1) *Liver and Gall Bladder disease*—Pain arises near or in the epigastrium extending into the back along the right subcostal margin to the right scapula. Both gall bladder and duodenal ulcer pain may be gnawing in character and relieved by soda or eating and may arise two or three hours after eating. Duodenal pain rarely is colicky in nature like what is found in biliary colic. Icteric index is high in gall bladder disease, and normal in duodenal ulcer. Blood sedimentation is important.

(2) *Duodenal Ulcer* may cause deep seated pain in the right hypochondrium, gnawing pain relieved by soda or eating. But duodenal ulcer shows slight leucocytosis with normal sedimentation rate. Cholecystitis shows marked leucocytosis and marked acceleration of sedimentation rate.

(3) *Pancreas*—Agonizing pain extending through the back or mostly in the median line. Normal icteric index.

(4) *Dietl's Crisis and Renal Calculi*—Absence of leucocytosis or acceleration of blood sedimentation rate.

(5) *Appendicitis*—Indicanuria is common in appendicitis while it is absent in gall bladder disease. Marked leucocytosis and almost normal sedimentation test indicate phlegmonous appendicitis, while marked leucocytosis

and markedly accelerated sedimentation rate dispel the diagnosis of acute appendicitis.

(6) *Intercostal Neuralgia or Neuritis*—Sharp stitching pain coming regardless of breathing and extremely sensitive to light pressure of the skin may be mistaken for cholecystitis. But constitutional and digestive symptoms are absent.

(7) *Sub-diaphragmatic abscess*—History of preceding gastric or duodenal ulcer, appendicitis, or hepatic abscess, or operation on lower abdomen. Onset of pain sudden or gradual. Septic temperature.

Acute pain of biliary colic is many a time mistaken for angina pectoris. As stated above some cases had been treated as cases of angina pectoris. It has been found that in many cases abnormal changes in the coronary vessels of the heart are due to infection in the gall bladder. However the patient with biliary colic is always restless and fussy while a patient with angina pectoris is perfectly still and gasping for breath. Residual pain and shock always remain in the patient with angina for some period after the acute attack has terminated. But in the case of biliary colic the patient is completely at ease after the acute attack subsides.

Jaundice was found to be a rare complication in the chronic cases of cholecystitis that came for treatment. It was present in about six of the acute cases. Two of the chronic cases with a very narrow common bile duct developed a slight icteric tinge after removal of the gall bladder which remained only for a couple of days. Most probably it was due to an oedema of the common bile duct. The so called typical gall bladder pain in the right shoulder was never noticed in any patient with chronic cholecystitis. Some patients with acute attack gave a history of shoulder pain but it was found to radiate to both the shoulders.

In one patient in whom pain did not disappear after cholecystectomy but recurred with the same severity as before, at the second operation a very long retro-caecal and retro-colic appendix very adherent to the bowel wall was found going up to the liver region. This was not noticed at the first operation and was most probably the chief factor in the causation of the abdominal pain, as after removal of the appendix the abdominal pain disappeared. All the same it has been noticed that pathological condition of the gall bladder is always accompanied by a diseased appendix, which should be removed at the cholecystectomy operation. Mention should be made of two cases with pain in the upper abdomen of some years' duration without any definite relation to food. History of hunger pain was absent. History of

jaundice was present in both the cases. On investigation both proved to be cases of duodenal ulcer and gastro-jejunostomy, gave complete relief.

*Gall stones* were found in about nine cases that were operated upon and in about eight cases that refused operation. The majority of stones found were of the mixed bilirubin calcium variety, small and crinated. In three cases the bile presented a gritty feel characteristic of thick sand. In one case a single stone that was found at operation was big, irregular in shape, dark grey in colour, hard and of cholesterol and bile pigment variety. In this case there was a renal stone co-existing. In two cases the stones were of the same above variety multiple and faceted, and fairly large. In all these cases the gall bladder was pathological and the history of gall bladder trouble was a fairly long one. Jaundice was present in only two of these cases, with pain of a constant nature. In other cases there were no special symptoms to indicate the presence of gall stones. Thus practically in every case the stones were secondary to a chronic pathological condition of the gall bladder. However the incidence of gall stones seems to be comparatively small in India, especially in this side of India, although I am told they are more common in the Punjab, and fairly common in Bengal. Perhaps this may be explained by Crile's theory of energy background, of the genesis of gall stones. According to him gall stones are less common among lower races of man, and among civilized races with negative philosophy,—Hindus and Chinese. In short no special symptoms were found to be present in any case of chronic cholecystitis which could make one suspect the presence of gall stones. But in acute cases in which fever with jaundice was present, usually stones were found on the operation table. *Carcinoma* was found only in two cases. In the first case which was operated on, the carcinomatous gall bladder was adherent to the pylorus giving rise to symptoms of pyloric obstruction with very few signs of gall bladder disease. Gastro-jejunostomy gave him temporary relief. The other case was a very advanced one and inoperable.

### Treatment

Out of the 150 cases that were observed or treated, 98 were operated on. Cholecystostomy was done in 2 cases, cholecysto-gastrostomy in one case, gastro-jejunostomy in 2 cases, and cholecystectomy in 93 cases. Operation was not done in acute cases except one case of ulcerated perforated gall bladder in which cholecystostomy was done by my Registrar, Dr. Ojah, and the patient survived. Expectant line of treatment caused the acute symptoms to subside in every case. In all the acute cases glucose was given by the mouth. Patients with jaundice were found to improve remarkably by 'eating' sugar cane (chewing it and drinking the juice) liberally. For the

severe pain of biliary colic *morphine* was found to be of little value, and glycerine trinitrate which was tried in a few cases did not give the expected relief. In three acute cases and also in a few chronic cases tablets containing cholesterine 1/100 gr, calcarea renal phos 1/100 gr, lithia benzoas 1/10 gr, and diomne 1/100 gr, sold by a homeopathist were tried and they gave complete relief from pain and the jaundice was found to disappear gradually. After the acute attack subsided a mixture containing ol terebenthinae 5 min, sod sulphocarbolas 10 gr, and tr cardamom co half a drachm, was given. In some cases dilute hydrochloric acid was found to be useful. Operation was done after the acute symptoms had completely disappeared. In about six chronic cases where intermittent colicky pain was the chief symptom, well marked relief was found by the use of a drug containing bile salts, bile acids and phenolphthaline sold as 'caroid pills' by the American Ferment Company. Of course in these cases pain was the most marked symptom. Gastric distension, local tenderness in the gall bladder area, and other symptoms of an inflamed gall bladder were not present. Most probably in these cases vagotonia was the predominant factor, and they came under the category of biliary dyskinesia described by Westphal.

The indications for operation were, persistent pain either continuous or intermittent with tenderness in the gall bladder area, and gastro-intestinal symptoms of distension and dyspepsia. Cholecystography was not always helpful as many a time a gall bladder that was found pathological on the operation table did not show any abnormality on the skiagram. In all cases except the first nine, a drainage tube was inserted near the foramen of Winslow before closing the abdomen and it was removed between the sixth and the eighth day. Suppuration of the wound usually occurred in those cases where the drainage tube was not inserted.

### Post-operative History

The vast majority of the cases were discharged from the hospital practically free from all symptoms. But in a fairly large number of cases post cholecystectomy pain was present for about a month or two after the operation. In two cases slight pain persisted for nearly one year and then it completely disappeared. The pain usually disappeared with an alkaline mixture containing tr belladonna. In two cases small doses of insulin injections gave complete relief. Large doses of urotropine given post-operatively produced haematuria in two cases.

### Mortality

Out of the 93 cases of cholecystectomy the mortality was 7. There was no mortality in the cholecystostomy and gastro-jejunostomy cases. Out

of the seven fatal cases, one died of tetanus. He had completely recovered from the effects of the operation and was found sitting on the bed smoking the 9th day, saying that he was feeling perfectly well. He suddenly developed tetanus on the 10th day, and died the next day. The second death occurred in a patient who came with severe jaundice and pain in the abdomen. The operation was done after the jaundice had disappeared. The gall bladder was found to be very much enlarged and the liver contained multiple abscesses. The gall bladder was removed and during the course of the operation the liver abscesses got opened. Death occurred three days after the operation. In this case operation ought not to have been done as a condition of pyelephlebitis was present. The third death occurred in a young man who started persistent bilious vomiting on the third day after the operation which continued till death occurred. In this case washing of the stomach, I am sure, would have saved the patient as it did in two other cases. The fourth death was in a female patient who went on sinking after cholecystectomy and died on the 8th day, most probably a case of liver death. The fifth death was in an alcoholic in whom a slightly enlarged gall bladder with 12 fairly big faceted stones was removed (vide Fig 1). The sixth fatal case was that of a patient with two big stones in the gall bladder. The gall bladder was very much thickened and fibrosed and flat throughout, without the usual division of fundus and neck, and firmly adherent to the liver and common bile duct. The cystic duct could not be properly identified. While removing the gall bladder a small portion of the thick fibrosed wall firmly embedded in the liver tissue which could not be removed was left behind. The patient developed pyelephlebitis on the 10th day and died within 12 days. The seventh death occurred in the case of a patient on the 5th day. The patient was progressing very favourably, but on the night of the 5th day he suddenly developed dyspnoea and other symptoms of pulmonary embolism and died within half an hour. The same night a patient who had oesophagectomy done on him for carcinoma died in the bed next to him. One wonders if the boy—he was aged about 20—had the complication of pulmonary embolism due to fright.

### Presentation of Cases

Case 1—S N Aged 30 Male Admitted on 31st December, 1935, for severe pain in the epigastrium, of about six days' duration. Tenderness was present in the right hypochondrium and slight icteric tinge of the conjunctiva. Patient was extremely debilitated. He was first seen by me in June 1925 for a very severe colicky attack. At that time he was very restless, shouting and pressing with his hands on the upper portion of the abdomen and the heart area, and saying that the pain was shooting toward the heart. From the way in which he was rolling about and bending down I suspected a colicky attack, and from the tenderness in the right hypochondrium with the direction of the radiation of the pain to the back and the chest, I suspected biliary colic and treated him accordingly. He was reported to be better, although the pain with radiation to the

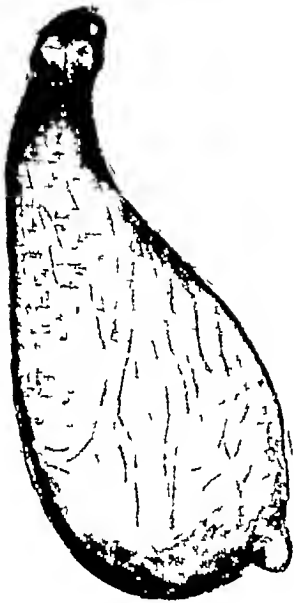


Fig 3  
Gall bladder enlarged and  
having a small papillomatous  
growth at the fundus

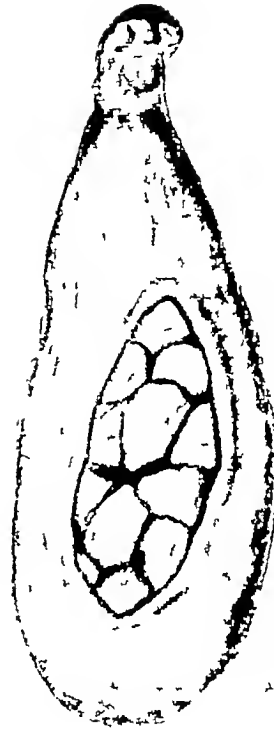


Fig 1.  
Gall bladder is enlarged  
and contains numerous  
faceted Calculi

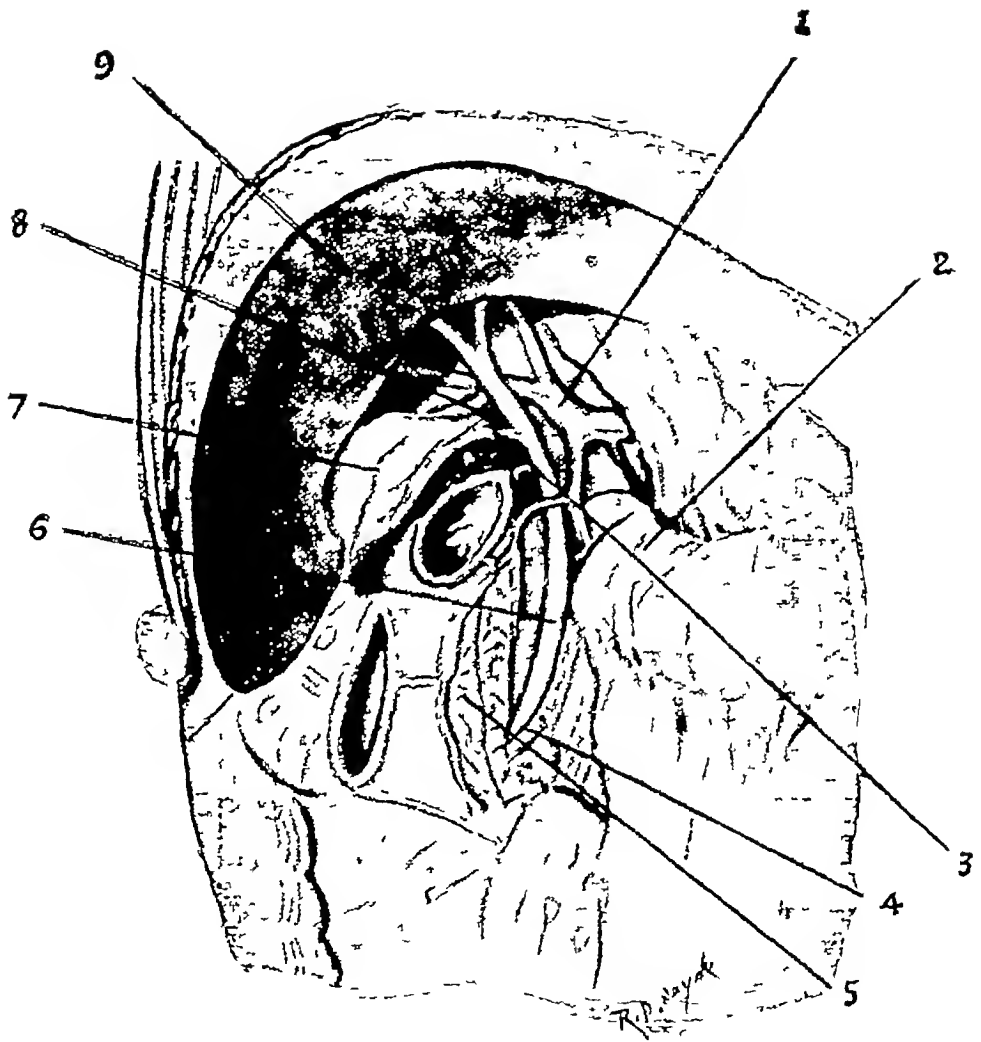


Fig 4

Gall bladder is atrophied, coat is thickened and changed in colour The aberrant artery is shown as a branch of the right hepatic artery going through the wall of the gall bladder and entering the right lobe of the liver (1) Hepatic artery (2) Pylorus (3) Cystic duct (4) Pancreatic duct (5) Pancreas (6) Common bile duct (7) Aberrant branch of hepatic artery (8) Cystic artery (9) Liver

heart area did not completely disappear. So he consulted a physician who told him that the pain was due to a weak heart, and advised him to take eggs and other nourishing food which made the pain worse. Then he got himself admitted into another hospital and was treated as a kidney case, but as nothing was found in the kidney he was discharged.

On admission his gall bladder area was found to be very tender and he showed all the symptoms of acute cholecystitis. He was given an expectant line of treatment, and blood was transfused as his general condition was very low. Cholecystectomy was done after about three weeks. The gall bladder was found to be pale red in colour, slightly elongated and covered with fibrous adhesions. The convalescence was rather stormy, and he had rather severe bilious vomiting with bad hiccough. Gastric lavage gave complete relief, and the icteric tinge of the conjunctivae completely disappeared. The course was smooth afterwards. He was discharged on the 12th day as he felt perfectly well. After about three weeks he returned complaining of severe pain in the epigastrium which he said was nearly as bad as before the operation. For this he was given a mixture containing alkalis and tincture of belladonna. This completely relieved him and since then he has been keeping perfect health, is married, and earning his livelihood as a clerk in a local bank. (Vide Fig 2)

In this case the gall bladder pain had been diagnosed and treated as cardiac and kidney pain for nearly ten years. Washing the stomach saved the patient after the operation when he got severe bilious vomiting. Post-cholecystectomy pain was relieved by an alkaline mixture containing belladonna.

**Case 2**—Female, aged 25. Admitted on 26th April, 1932, for pain in the gall bladder area radiating to the back in the interscapular region for about two years. She had been diagnosed as a case of appendicitis. Radiogram did not show any abnormality of the gall bladder. On opening the abdomen the gall bladder was found to be slightly enlarged, reddish in colour and covered with adhesions. The cystic duct was embedded in a thick layer of fat. On the fundus of the gall bladder there was a hard nodular growth of the size of a small pea. The gall bladder was removed and the patient felt free from pain for about three months. Then she used to complain of pain off and on for about a year. After that the pain completely disappeared. She was in perfect health when seen in 1938.

In this case the gall bladder was full of adhesions and a small nodular growth was present on the fundus. Cholecystography did not show any pathological condition of the gall bladder. Post-cholecystectomy pain was present for about one year after which it completely disappeared. (Vide Fig 3)

**Case 3**—Male, aged 31. Admitted in December, 1936, for acute abdominal pain of ten days' duration. Had similar attack of pain starting suddenly one year ago. After that it recurred four or five times. Tenderness in the gall bladder region with slight jaundice. On opening the abdomen the gall bladder was found to be very much contracted, pale grey in colour, and covered with adhesions. The cystic artery was first ligated. The serous coat was firmly adherent to the viscus and could not be separated. While isolating the cystic duct, a thick blood vessel—most probably a branch of the hepatic artery—was found passing along side the cystic duct, toward the fundus of the gall bladder. It was tied and divided along with the cystic duct, and the gall bladder was detached from the liver bed. The fundus was firmly adherent to the liver and had to be removed piecemeal. At this point an aberrant branch of the hepatic artery was found to be embedded in the wall of the gall bladder, and passing on to the right lobe of the liver. According to Reginald Jackson, in rare cases the right hepatic artery runs parallel to the cystic duct, and then arches behind it, at the neck of the gall bladder. But

if the right hepatic artery had been ligated, it would have given rise to some severe complications due to deprivation of the blood supply to the right lobe of the liver. But in this case no post-operative complications occurred, and the convalescence was smooth. The patient was discharged in good condition, and was found to be in sound health some months later.

In this case the aberrant blood vessel passing through the wall of the gall bladder might have caused the pathological condition of the gall bladder (Vide Fig 4)

**Case 4—W** Male, aged 24. Admitted in January, 1937, for severe pain in the epigastrium and vomiting, which according to the patient contained blood. About 18 months before he got severe abdominal pain with haematemesis, and had the operation of gastro-jejunostomy done on him in another hospital as a case of duodenal ulcer. He felt perfectly well for about six months. But after that severe abdominal pain and vomiting reappeared. He was a heavy smoker and used to take alcohol frequently. He was suspected to have developed a jejunal ulcer. But on clinical and radiological examination, jejunal ulcer was excluded. Cholecystography showed non-filling of the gall bladder. The gall bladder area was very tender, especially during the presence of the pain. A very significant thing that was noticed was that Westphal's syndrome was well marked when symptoms of pain and tenderness were present, and noticeably absent during the quiescent period.

On opening the abdomen the gall bladder was found to be much enlarged, and involved in adhesions. The colour was normal and Lund's sentinel glands could not be detected. The cystic duct was very much narrowed, elongated and surrounded by thick fibrous adhesions. The gall bladder was removed. The convalescence was smooth and the patient was discharged free from all symptoms. Since then he has had no recurrence of the trouble, and has been keeping very good health.

In this case the symptoms were most probably due to fibrous contractions of the cystic duct, giving rise to spasm of the gall bladder. The presence of Westphal's syndrome during the pain and its absence otherwise is rather significant. According to Nathan A. Womack, "Beneath the muscularis in the wall of the gall bladder, one often encounters single ganglion cells, and at other times relatively large ganglia. These probably represent vagal pathways. The pain fibres to the biliary tract extend along the hepatic and cystic artery. These extend through the musculature and apparently terminate in the mucosa or possibly between the epithelial cells of the mucosa. These fibres have no specialised endings, but terminate as exposed nerve fibres. The pathological changes associated with the nerves of the gall bladder consist for the most part of fibrosis and inflammation. The lymphocytic reaction is often seen only around the nerve. This may be due to the close proximity of the nerve trunk to the lymph channels. Such an area of inflammation is associated with increased irritability on the part of the nerve. The stimulus probably is that of increased intracystic or intraductal pressure, either due to abnormal closure of the sphincter of Oddi, or due to the spasm of the sphincter or duodenum, or some other portion of the biliary tract. The association of pain, nausea and vomiting, with increase in intraductal pressure, has been noted by Schrager, Ivy, and others."

The above symptoms in the patient might have been due to sudden increase in pressure in the intra-biliary tract as a result of muscle spasm. In those patients with severe gall bladder disease who are not completely relieved of their symptoms after cholecystectomy, it is possible that there is a certain amount of nerve damage around the common duct which is responsible for the symptoms.

**Case 5—Male**, aged 48. Admitted on 22nd September, 1937, for jaundice, pain over left iliac fossa, and loose motions with blood and mucus. He gave a history of dysentery

two years previously Dysenteric stools were absent for one year, but for the last three months he had been passing blood and mucus with pain all over the abdomen, most marked over the left iliac fossa Jaundice present for one month Right hypochondrium very tender Van den Bergh test positive indicating some biliary obstruction The jaundice disappeared after treatment with biliary stimulants, and Van den Bergh test became negative No ova were found in the stools and sigmoidoscopic examination showed no lesion in the rectum

Blood transfusion was given as the patient's condition was very low, and the gall bladder removed on 30th November, 1937 The gall bladder was comparatively free from adhesions, and there was not much of a change in the colour of the viscus But the blood vessels on its surface were very much dilated and the common bile duct was bigger than normal The convalescence was smooth and the patient was discharged free from all symptoms and very much improved in health

In this case the most noticeable symptoms were those of colitis, and history of old dysentery was present Side by side there were symptoms of gall bladder lesion as well It is difficult to say if the gall bladder lesion was secondary to an attack of dysentery or the irritation of the colon was due to a pathological gall bladder

*Case 6—G.P.S* Male, aged 30 Admitted on 11th December, 1937, for abdominal pain of about two years' duration Pain started suddenly, was of an intermittent character and used to increase after food For the last two months pain had become very severe Slight jaundice was present at the time of admission History of haematuria, but X-ray showed no abnormality of the kidneys or even of the gall bladder Van den Bergh test was found to be indirect positive There was well marked tenderness in the gall bladder area On opening the abdomen the gall bladder was found to be slightly enlarged, pale yellowish in colour, and stones were felt inside on palpation Cholecystectomy was done Convalescence was smooth, except for an attack of parotitis The patient was discharged free from all symptoms, and much improved in health

In this case the remarkable and unusual symptom was the presence of blood in the urine, although the lesion was only in the gall bladder Cholecystography showed a normally functioning gall bladder, although it contained multiple stones

*Case 7—J* Male, aged 42 Admitted in 1938 for operation of hydrocele He was a healthy looking man, but he complained that of late he had been getting repeated attacks of angina pectoris Physicians had told him that it was a case of pseudo-angina as no organic disease of the heart could be detected He got such an attack while convalescing from the hydrocele operation He complained of very severe pain in the heart area, and was found lying in the bed, with his hand on the chest resenting any interference There was no change in the pulse, nor was there any dyspnoea The attack lasted for about seven minutes No residual symptoms could be detected after the disappearance of the pain On physical examination well marked tenderness was found to be present in the epigastrium and the gall bladder area, but nothing abnormal could be detected in the heart area Westphal's syndrome was positive On being questioned about the history of his complaint, the patient said that about eight years previously when the province of Gujrat suffered from heavy floods, he had to live for some weeks on the second story of his house in the flooded area of his village The stay in the damp atmosphere caused severe gastro-intestinal trouble, from which he suffered for some months Since then he has been getting these so called anginal attacks

Most probably this was a case of chronic cholecystitis giving rise to attacks of pain resembling angina pectoris Unfortunately the patient did not submit himself to any further investigation, so diagnosis could not be confirmed The coronary arteries are activated by a pathological gall bladder The other theory is that there is a disturbance

in the viscerosensory reflex. Irritation of the spinal nerves due to disease of the gall bladder is carried to the sensory plexus supplying the aorta and the coronary vessels, producing pain of angina pectoris. Cases have been quoted in which surgical treatment of the gall bladder has been followed by relief of cardiac pain. A study of morbid anatomy reveals the fact that in subjects with disease of the gall bladder, the degree of arterial degeneration is higher than in those with normal gall bladders. So it would appear to be rational to deal thoroughly with cases of cholecystitis or gall stones as soon as diagnosed.

**Case 8**—Mrs G Female, aged 39 From Peshawar Came with a history of severe angina-like attacks of pain in the heart area, accompanied by attacks of fainting fits. Just as she was reclining on the examination table she uttered a sharp cry saying that she was getting the fit with pain in the heart. On examination nothing abnormal was detected in the heart, but the gall bladder area was very tender. There was history of severe dyspepsia and distension of the stomach after meals. The above mentioned pills containing cholesterine gave her immense relief and the so called heart attacks completely disappeared, although the patient still complains of slight distension after meals. Most probably it is a case of cholecystitis with stones.

**Case 9**—C Male, aged 44 Got severe palpitation of heart and mild anginal attacks in 1930. The condition was diagnosed as heart trouble. The attacks used to be accompanied by distension of the stomach due to flatulence. Symptomatic line of treatment with complete rest gave marked relief. Food was specially regulated. A similar attack but much milder occurred in 1942. But this time symptoms of gastric distension were more marked. Treatment was given on similar lines as before and condition improved. As history of dyspepsia was present for many years gall bladder trouble was suspected and examination revealed a very tender gall bladder, and skiagram showed a badly functioning gall bladder. Most likely the heart symptoms were secondary to a pathological gall bladder (Figs 5, 6 and 7).

**Case 10**—Male, aged 25 Admitted for discomfort in the abdomen with belching after food and pain on the left side of the umbilicus and the heart area. The trouble started with pain in the heart area, and then he started getting dyspeptic symptoms, especially loss of appetite. He was treated at Miraj and Ratnagiri with Decholine injections which gave him temporary relief. Tenderness was present in the lower abdomen 1" to the left and below the umbilicus, but it disappeared when pressure was maintained in the gall bladder area. Cholecystography showed a defective filling of the gall bladder. Cholecystitis was suspected and the gall bladder was removed. The cystic duct and the common bile duct were found to be very narrow. The patient developed slight jaundice on the 4th day of the operation but it disappeared on the 6th day. Perhaps this was due to the oedema of the inner lining of the common bile duct. The patient improved immensely after the operation. His chest and abdominal pain completely disappeared and the appetite considerably improved.

In the above two cases also the cardiac symptoms had their origin in the gall bladder. The presence of tenderness and pain on the left of the umbilicus is significant.

**Case 11**—P.B.S.I. Age 45 Admitted on August, 1939, for severe pain in the abdomen and deep jaundice with fever. History of abdominal pain with fever one year before. Pain and fever disappeared with rest and treatment. Westphal's syndrome well marked. Two stones were seen in the skiagram in the gall bladder area. At the operation only one stone was found in the gall bladder. The other one could not be traced although the common bile duct was probed carefully without anything being found. The convalescence was stormy due to severe post-operative bronchitis. But the patient was discharged on the 18th day free from all symptoms. About a month after the operation

# Pathological Conditions of the Gall Bladder

(DR. V. M. KAIKINI)



Fig 2 Gall bladder normally filled with the dye, although it is pathological It shows some ptosis and elongation



Fig 5. Gall bladder is not seen and the dye noticed in the ascending colon

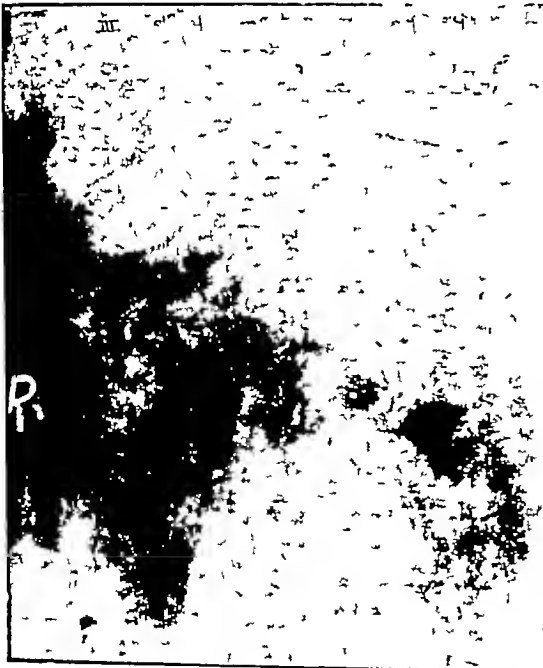


Fig 6 Gall bladder very faintly seen (not filled normally) Pathological

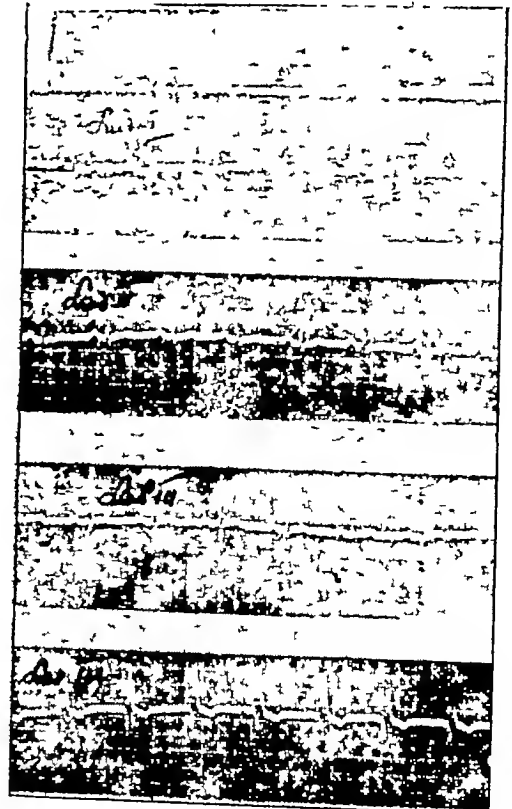


Fig 7 Electro-cardiogram showing left axis deviation.

# Pathological Conditions of the Gall Bladder (DR V. M. KAIRINI)



Fig 8. Skiagram shows two stones one in the gall bladder and the other in the kidney.



Fig 9 Skiagram shows one stone (kidney stone) after removal of the gall bladder stone



Fig 10. Skiagram showing a horizontally lying gall bladder which fills normally

he ate Padwal curry and got severe pain and vomiting. Pain started below the umbilicus radiating to the left side. He passed urine containing blood. The second stone was apparently a kidney stone as is evident from the second skiagram, which was taken after the operation. This is a case where stones of the kidney and gall bladder coexisted (Figs 8 and 9).

Case 12—V.F. Age 19. Admitted Nov 1942, with chronic pain in the right hypochondrium. Had continuous fever for about 28 days a few days before admission. History of typhoid 5 years back. History of jaundice. On opening the abdomen the gall bladder and adjoining viscera were found involved in thick adhesions, stomach greatly dilated. The gall bladder was not enlarged but pale ashen in colour, tense and distended, and firmly adherent to the second part of the duodenum. It was found to contain stones on palpation. With great difficulty the fundus of the gall bladder was separated from the duodenum and in doing so the wall of the duodenum was torn for about four inches opening up its lumen, revealing the bile duct papilla and a couple of small crenated gall stones. This indicated that the gall bladder had formed a communication with the duodenum by ulceration and stones had been passed into its lumen. With extreme care the rent in the duodenal wall was sutured and gastro-jejunostomy done. No attempt was made to remove the pathological gall bladder, as it was not possible to isolate the cystic and common bile duct on account of strong adhesions. Moreover the condition of the patient was far from satisfactory. The convalescence was uneventful, and he was discharged free from pain after about sixteen days. When seen after six months he was feeling much better, had good appetite and no pain. But some heaviness was present after meals. The gall bladder has not yet been removed.

Case 13—Male, aged 45. Consulted me for severe pain in the right side of the abdomen and epigastrium, worse after food, of about 10 years' duration. At first it was intermittent, but recently it had become constant and more severe. Radiologist was of opinion that the skiagram indicated the presence of a duodenal ulcer. The gall bladder was found to be filling normally in cholecystography, but the position of the gall bladder was more or less horizontal. The radiologists were of opinion that the gall bladder was normal, and that the position of the gall bladder did not indicate a pathological condition. From the history of distress after meals accompanied by colic attacks of pain off and on, from local tenderness, presence of Westphal's syndrome, and also from the abnormal position of the gall bladder in the skiagram, I diagnosed the case as chronic cholecystitis. He was operated on by another surgeon and I was told that there was no evidence of duodenal ulcer and the gall bladder was not found to be pathological. But an elongated adherent appendix retrocaecal and going up toward the liver was removed. The patient felt better for about fifteen days. But after that he wrote to me that he has been getting attacks of abdominal pain of the same type as before the operation but much more severe in intensity. The operation had been done about eight months back. (Fig 10)

In this case, from the clinical signs and symptoms I am still of the opinion that it is a case of chronic cholecystitis.

### Summary

- 1 Gall bladder diseases are very common in India, although stones in the gall bladder are comparatively rarer than in the West, especially in our part of India.

- 2 The majority of patients with cholecystitis gave a history of an attack of typhoid or dysentery and some sort of irregularity in their mode of

diet, such as long intervals between meals, absence of fats in their diets, etc. Alcohol was responsible for the pathological condition of the gall bladder in about ten cases

3 Gall bladder pain may be due in many cases to disturbances in the nervous system particularly vagotonia, without any pathological condition of the gall bladder being present

4 Pathological conditions of the gall bladder may give rise to attacks of pain in the heart area resembling angina pectoris, and may in advanced cases cause degeneration of the heart muscle, and of the whole arterial system

5 After cholecystectomy post-operative pain is very common, and may occur for some months. It usually disappears with belladonna in an alkaline mixture, or small doses of insulin

6 Jaundice is a rare complication of cholecystitis, so also pain in the right shoulder. But pain in the angle of the right scapula is often present

7 The presence of Westphal's syndrome is diagnostic of gall bladder disease, but its absence does not exclude lesions of the gall bladder

8 Cholecystography cannot be always depended upon in diagnosing pathological conditions of the gall bladder

9 Chronic inflammation of the gall bladder is followed by fibrosis of the nerve ganglia incorporated in the wall of an inflamed gall bladder, and irritation of these ganglia and nerve terminals due to distension of the organ gives rise to the typical gall bladder pain

10 In good many cases of chronic cholecystitis pain was complained of in the lower abdomen, one inch below and one inch to the left of the umbilicus accompanied by some tenderness

The author's thanks are due to Messrs R D Nayak and R S Savardekar, artists, G S Medical College, Bombay, for the diagrams published in this article

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# CARCINOMA OF THE LARYNX\*

BY

H D GANDHI, M B, B S, F R C S AND S G JOSHI, M B, M S

In bringing before you the subject of Cancer Larynx for discussion, we are fully aware of our shortcomings from the point of view of our ability to present the subject from all the various angles of approach. Still we are emboldened to do so because we feel this branch of surgery has not received the attention and consideration it deserves. There are some facts and fallacies associated with cancer of the larynx. It is true that sometimes it does need a very serious and mutilating operation, depriving the patient from his highest attainment in his evolution, viz, speech, the medium of social intercourse, even when the patient comes through the risk of an operative mortality of 15% to 50%. Speech, however, can be restored by means of an artificial larynx and the operative risk can be appreciably reduced by being on the lookout for early cases.

Cancer of the larynx which would be 100% fatal, if left to itself, gives 80 to 85% lasting cure if the public and the general practitioners were to realise what a continued change in voice or a continued discomfort in the throat in an adult could mean. Even in some of the comparatively neglected cases of intrinsic cancer, cure is as high as 45%, while, in the other type of hopelessly advanced extrinsic cases, we have obtained comparatively gratifying results.

Although irradiation plays a very great part both in the curative and the palliative treatment of cancer, is the method of choice in extrinsic cancer of larynx of grades III and IV and has, in many cases, to supplement surgical interference, yet we cannot say much about it because on account of circumstances beyond our hospital control, it was not freely available to us during the period under consideration. However, we trust some of you will be able to present the subject from this angle and so help us to complete it.

Oto-rhino-laryngology is a speciality developed out of general surgery. It is but natural that in the earlier days operations like laryngectomy were seldom undertaken. Because so many of our advanced cases were sent away with only tracheotomy, one of us with the collaboration of two of our senior Surgeons of the K E M Hospital, Dr Bacha and Dr Kaikini undertook to deal with such advanced cases. The first successful laryngectomy was done in collaboration with Dr Kaikini in 1931. The second case was done with

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\* Paper read before the V Annual Conference of the Association of Surgeons of India

Dr Bacha in 1933 and is alive to this day and in good health and the first case could be traced till seven years after operation. We are very much indebted to them for readily taking up the earlier cases with us.

### Anatomy

The laryngeal box is composed of hyaline cartilage, a very efficient barrier against the extension of epitheliomatous processes. Intrinsic cancer does not penetrate the cartilaginous wall until the way has been prepared by suppurative processes from mixed infections.

The lymphatic system of the intrinsic larynx is of great clinical importance. The lymphatics do not lead to the perichondrium. They extend anteriorly and posteriorly. The lymphatic drainage of this part is very poor as compared to almost any other region of the body. It is this poverty of its lymphatic system that makes intrinsic cancer of the larynx so slow to metastasize and so much more favourable for operative treatment than cancer anywhere else in internal surfaces.

#### *Lymphatics—*

- (a) The supra glottic system—of its respective side—consists of a network of capillaries in the submucosa, large channels from this follow the course of the superior laryngeal artery through the thyro-hyoid membrane and drain into the superior deep cervical lymph glands lying on the internal jugular vein—at the level of the bifurcation of the common carotid artery.
- (b) The lymphatic network of the vocal cords appears both experimentally and clinically to be a comparatively closed system, as pigmented fluids after injection remain localised and cancer of the vocal cords is for a long time confined to this system, there being no early involvement of glands. It drains through lymphatics passing through the crico-thyroid membrane into a small gland lying on it.
- (c) The subglottic lymphatics—somewhat less dense than the supra-glottic—converge laterally to the back of the crico-tracheal membrane, whence they drain into a chain of glands around the recurrent laryngeal nerve and thence into those lying on the internal jugular vein.

### Etiology

The origin of cancer is still an unsolved problem. Bellance has summarised the present state of knowledge. The efficient cause lies beyond the

irritation or injury which are but partial causes of the disease The injury prepares a nutrient soil favourable for the growth of the effective agent of malignant disease

*Predisposing causes—*

Heredity, chronic irritation, excessive use of the voice, abuse of alcohol and tobacco, syphilis, have all been arraigned as predisposing causes without definite proof Chevalier Jackson attaches great importance to "vocal abuse—which is one of the commonest causes of chronic laryngitis, keratosis, papillomas and granulomas which in turn form a favourable soil for development of cancer" He thinks that cancer rarely if ever appears in the previously perfectly normal larynx and believes in a pre-cancerous condition

*Age—*

Age has a definite influence on the incidence of the disease It is unusual below 30 and most common between 40 and 50 years Yet it is not unknown between 10 and 30 years

TABLE I

**Age incidence**

Out-patients . . 184

In-patients . 86

		20-30	30-40	40-50	50-60	60-70	70-80	80-90
Out-patients	...	15	56	63	34	8	7	1
In-patients	..	9	24	31	16	5	1	—
		<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
		24	80	94	50	13	8	1

Our youngest patient was 28 years and oldest patient was 85 years

The post-cricoid type of growth—which occurs usually in females—occurs at an earlier age than the other varieties

*Sex—*

Plays an important part in the incidence of the disease It is about 9 or 10 times more frequent in males than in females. 89% males and 11% females.

TABLE II

		Sex						
		Males			243 89%			
		Females			27 11%			
		20-30	30-40	40-50	50-60	60-70	70-80	80-90
Males	...	21	66	90	45	12	8	1
Females	..	3	14	4	5	1	—	—
		<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
		24	80	94	50	13	8	1

## Classification

## (a) Clinical

- (1) Intrinsic or cordal cancer
- (2) Extrinsic (i) from ventricle and ventricular bands, (ii) pyriform fossa, epiglottis and aryepiglottic folds and arytenoids, (iii) subglottic, (iv) post-cricoid
- (3) Mixed

Intrinsic growths are those located on (i) the vocal cords, (ii) the ventricles, (iii) the ventricular bands and (iv) inner aspect of the inter-arytenoid region.

Extrinsic growths are those located on (i) epiglottis, (ii) aryepiglottic folds, (iii) the arytenoids, (iv) the pyriform sinuses, (v) the part of the posterior laryngeal wall that forms the anterior wall of the hypopharynx, and (vi) The upper border of the ventricular bands merging into the aryepiglottic folds must be included in the extrinsic area

## (b) Pathological

Commonest carcinoma is squamous cell epithelioma (96 to 98%) Any other variety may occur, *e.g.*, sarcoma, endothelioma, chondro-sarcoma and even adeno-carcinoma and basal celled carcinoma

## (c) Histological

- (1) Cancer arising on a vocal cord or in the subglottic region is almost always a squamous celled epithelioma, but occasionally may turn out to be a basal cell carcinoma (resembling endothelioma)

(2) Adeno-carcinoma—when it arises from the mucous glands in the ventricle

Classified according to Broder's histological grading, our series showed the following percentages I—5%, II—62%, III—24% and IV—9%. This grading is based on the fundamental principle of cell differentiation and absolutely independent of the clinical history and helps us in deciding the line of treatment to be followed in a particular case. Grades III & IV are comparatively unsuited for operation because recurrence is much more likely after their removal, whereas in grades I and II which are more differentiated types—freedom from recurrence is more likely after a successful operative removal.

### Lines of extension

On the vocal cords, (a) it tends to extend along its length. Anteriorly, it may extend across the commissure to opposite vocal cord, (b) it may extend to the subglottic region, (c) posteriorly, it usually stops at the vocal process of the arytenoid, and (d) it may become extrinsic extending to arytenoid, ventricle and false vocal cord, aryepiglottic fold, and pyriform fossa.

When the anterior commissure is reached the base of the epiglottis may be invaded insidiously and this is apt to escape detection even on careful examination with the mirror. Any extension beyond the arytenoid whether backwards or upwards reaches the open lymphatic area of the pharynx.

Intrinsic cancer of the vocal cords is slow in growth because of two reasons —

- (a) closed system of lymphatics, and
- (b) partially due to the resistance which cartilage offers to the spread outwards of cancer.

For similar reasons, cancers originating in the central portion of the epiglottis are of low malignancy and in this respect there is some similarity to cancer of the vocal cords. The lymphatic glands are not usually attacked until the growth has spread either to the base of the tongue or to the aryepiglottic folds.

### Diagnosis

*Mirror examination* is extremely important and always necessary, but alone, the mirror appearances are not conclusive. No mirror examination is complete unless the anterior commissure is clearly exposed to view. It is said, "Death often lurks under an overhanging epiglottis." It is not merely

the anterior commissure, but the suprajacent, nearly vertical wall of the posterior surface of the epiglottis that must be seen

Three things are to be noted (a) colour, (b) form, and (c) movement  
Form—thickening—localised elevation, ulceration

Movement—may be normal—non-fixation of vocal cords does not exclude cancer But fixation of vocal cords is an advanced stage of cancer

Impaired movement may be from—(a) Impaired innervation, (b) Impaired musculature, and (c) Impaired cricoarytenoid joint

Cancer is one of the lesions that can produce any or all of these different pathologic mechanisms When larynx seems normal except for the impaired mobility, cancer of the hypo-pharyngeal or subglottic area is to be suspected

Pitfalls—

- (a) reliance on a single mirror examination, and
- (b) failure to expose the anterior commissure and posterior surface of epiglottis

*Direct laryngoscopy—*

- (a) First make a general physical examination of all systems and note the fitness of the patient for an examination
- (b) The patient should be fasted for 5 hours at least in order to forestall vomiting
- (c) If there is difficulty in seeing the anterior commissure even after increasing the lifting motion and elevation of the head, the assistant should by his index finger externally on the neck depress the thyroid cartilage

*Biopsy—*

It is always an early and indispensable step in the study of every case in which benign or malignant neoplasm of the larynx is one of the diagnostic possibilities

It has been noticed in a case of an intrinsic cancer of the larynx that had become extrinsic, that the section near about the vocal cord was grade I and that from the external one showed grade IV, and therefore it is worth while taking sections from different parts of the growth If in doubt, biopsy should be repeated before deciding on the nature of the tissue In some

cases a punch biopsy could be taken after indirect laryngoscopy. But biopsy could be done with greater precision with direct laryngoscopy which is the usual method we have followed in taking sections.

#### Difficulties—

- (a) When the growth is subglottic—it may be difficult to take a section at times
- (b) In early post-cricoid cancer and in early nodular growth in the vocal cords which are not fixed in such cases, it is better to wait and watch the progress, the patient being observed every week or 15 days, meantime taking rest, abstaining from tobacco and alcohol, for a period of 6 weeks

Histological confirmation by biopsy is advisable before any operation for malignant tumour of the larynx is undertaken. Conditions here are quite different from other regions. The loss of a mamma from an erroneous diagnosis does not constitute a disaster in any way comparable to the loss of the larynx. Moreover, diffusion of cancer by biopsy may be possible in other regions, e.g., in the breast, because there is a network of lymph channels that lead everywhere and anastomose freely. In the intrinsic part, there are no apparent lymphatic vessels. Consequently, the taking of a specimen is not followed by metastasis. This anatomical explanation is borne out by clinical evidence. So far as the extrinsic growths are concerned, when one has to decide between operation by laryngectomy and radiation therapy, biopsy is essential to grade the malignancy of the growth.

#### Symptoms and Signs

*Symptoms* vary according to the site of origin and the extent of the disease. A small growth on the edge of the vocal cord will produce persistent hoarseness, while in a situation such as the aryepiglottic fold it may reach a considerable size without symptoms, and sometimes only a secondary deposit in a gland in the neck first attracts one's attention.

A subglottic growth may cause nothing beyond slight local discomfort until it is large enough to interfere with breathing or speech.

A growth on the epiglottis or in the post-cricoid region may readily cause dysphagia before it disturbs the larynx or infects the glands.

#### *Intrinsic Carcinoma of the Larynx—*

- (a) Carcinoma seldom originates on the posterior 1/3 of the vocal cord or the processes vocales.

- (b) The central portion or the anterior half of the vocal cord is the favourite location
- (c) The two extremities in a true cordal cancer are generally free in early cases

There is no internal region in the body where cancer gives such an early and decided warning of its occurrence as in the cavity of the larynx where it remains so long localised

In early cases the only symptom is hoarseness, slight at first but generally persistent and progressive. It may show itself as voice fatigue

For many months, there is no pain, no cough, no dysphagia and no complaint besides change of voice

In later stages, the growth spreads until it so narrows the glottis that the hoarse voice becomes almost inaudible and dyspnoea and stridor slowly develop. If the obstruction is not relieved at this stage, death may occur suddenly as in other cases of laryngeal stenosis

The disease untreated continues to increase so as to entail aphonia, pain, dyspnoea and dysphagia. It may become extrinsic

#### *Ventricular band carcinoma—*

It may arise from the ventricular band or from the ventricle

It may develop in the depth of the false vocal cords and may become manifest on the surface as an irregular, knobby, sprouting and ulcerating growth

Early symptoms in this form may be absent or slight. The voice is not affected early. It may only be a little muffled. Once the disease reaches the surface, it is apt to fungate and encroach on the glottis, so that some dyspnoea may be an early symptom. There is more local discomfort, causing irritation, hemming and even sharp pains radiating to the ear. Bleeding is not unknown

#### *Progress—*

The disease in this situation is marked by vascularity, rapid proliferation and tendency to spread round to the opposite side. It does not tend to invade the true vocal cord—mobility of vocal cord may remain unimpaired. In the external direction, extension is early. It causes early invasion of the glands,

*Mobility of vocal cord—*

Impaired mobility is not an early symptom. Hoarseness may be present and a cordal tumour may be visible for months before the movement of the cord is affected. Free mobility is no evidence that a growth is not malignant.

*Sub-glottic carcinoma—*

It will explain some cases with absence of throat symptoms and others in which the cause of a paresis of one cord is not at first apparent.

Alteration in voice in this group is not necessarily the first nor a very noticeable symptom.

Patient may complain of colds in the throat, and may feel the voice veiled and find a difficulty in shifting the catarrh from the larynx. There are no general symptoms. The gradual onset of slight dyspnoea and stridor on exertion—two indications much neglected both by the patient and the profession, may first bring the case to a laryngologist who may fail to find anything serious in the early stages unless a direct laryngoscopy is done.

*Extrinsic carcinoma—*

Symptoms are insidious, vague, and uncertain. Metastatic deposit in the glands of the neck may come to the notice of the patient first before he complains of any discomfort in the larynx.

In all these situations, a tumour will first make its presence known by

- (a) local discomfort and increasing salivation,
- (b) difficulty in getting rid of an increasing amount of secretion, and
- (c) increasing dysphagia.

The symptoms of extrinsic laryngeal carcinoma are primarily concerned with deglutition. The discomfort increases to pain which is generally unilateral, is apt to radiate up to the jaw or ear on the same side and is increased on swallowing.

*Course and progress—*

They progress rapidly. If untreated, many patients succumb within a year of the first manifestation of the disease. During this time the pain, salivation and dysphagia steadily increase. As the growth invades the larynx, the voice becomes muffled and dyspnoea and stridor develop. When

the growth ulcerates and fungates the results of sepsis are added, foul breath, discharge, sloughing, hæmorrhage, fever, wasting and cachexia. The glands on each side become inflamed and tender. Perichondritis and necrosis of the laryngeal cartilage may occur.

### *Signs—*

It is very important to view the larynx both during quiet respiration and when it tilts up on high phonation. Phonation also helps to display a neoplasm on the edge of the posterior surface of the aryepiglottic fold and may bring into view the upper margin of a post-cricoid growth.

In the post-cricoid region, it is difficult to get a good view in early cases.

In early cases, on mirror examination, nothing can be seen except a collection of frothy saliva in the pyriform sinus.

Early diagnosis, especially in the intrinsic form, offers every promise, almost a certainty, of lasting cure. In the extrinsic form, it is the chief hope and has given us encouraging results in some very advanced cases much beyond our expectation.

Of the series of 325 cases presented, we found so many as 310 seeking medical advice for the first time—with either fixed vocal cords or enlarged glands in the neck or for the relief of dysphagia or dyspnoea.

Of the total of 325 cases, only 15 were suitable for laryngo-fissure and only 4 underwent it.

### *Carcinoma of the larynx is to be diagnosed from—*

- 1 Tuberculosis
- 2 Chronic laryngitis
- 3 Keratosis
- 4 Submucous hæmorrhage
- 5 Innocent neoplasms—papilloma, angioma, fibroma
- 6 Syphilis
- 7 Rhino-scleroma
- 8 Prolapse of ventricle
- 9 Paralysis of recurrent laryngeal nerve
- 10 Perichondritis
- 11 Crico-arytenoid arthritis

In advanced cases, the diagnosis can be established without much difficulty. In early cases it is often less easy.

In all the laryngeal diseases, the appearances vary a little from time to time. In innocent neoplasms they are more stationary. In tuberculosis they are generally progressive, while becoming more characteristic. A sharp lookout must be kept for evolution of a deposit elsewhere in the larynx, *e g*, thickening of the epiglottis, infiltration of one aryepiglottic fold or arytenoid region or pseudo-oedema of arytenoid, might be sufficient to show that the original lesion is of a tuberculous nature.

Repeated examinations at intervals of one to four weeks will often reveal developments which escape us at a first inspection. They show the gradual progress of the lesion.

#### General investigation—

- (a) Wassermann or Kahn test should be done in every case. It is known that a negative Wassermann reaction does not exclude syphilis. Cancer may develop in a syphilitic as much as in a non-syphilitic. Cancer may supervene on a syphilitic process in the larynx, or may attack a patient with pulmonary tuberculosis, or may develop in a larynx already affected with tubercular laryngitis, or it may follow syphilis and tubercle.

In one case MacKenty has verified the presence of syphilis, T B and cancer in the same larynx.

- (b) X-ray of the chest
- (c) Sputum examination—repeated

#### Change in mobility of cord—

Free mobility of the vocal cord does not exclude cancer. Impaired mobility or fixation is an advanced condition. Syphilis, and to a less extent, tuberculosis may also interfere with the movements of the vocal cord. There is more limitation of movement in cancer than in T B in proportion to the extent of the lesion.

#### Biopsy—

The final proof that a growth is a carcinoma must remain with the microscope.

#### Tuberculosis of the larynx—

Of the various conditions mentioned, the most frequent error is to mistake a tuberculous lesion for carcinoma.

Tubercular lesion occurs with greatest frequency in the inter-arytenoid space, an area where carcinoma never originates. But occasionally TB may start in the anterior half of the larynx, choosing the favourite site of origin of intrinsic cancer. The difficulty is enhanced, if there is some impairment of movement.

The patient must be thoroughly examined to exclude tubercular infection. Blood, X-Ray, sputum, temperature, fatigue, loss of weight, physical signs and sedimentation test should all be investigated.

Tuberculosis may originate in the larynx in an elderly vigorous individual without any TB in sputum and with negative chest signs and symptoms. In such cases the diagnosis could not be established in any other way, within a reasonable period, except by biopsy. Cases in which tuberculous lesions remain confined to one or both cords, or extends only to the subglottic region, are not rare in middle aged and elderly persons.

The presence of a carcinoma superimposed on a syphilitic lesion of the larynx can be confirmed by biopsy alone when the Wassermann reaction is positive.

#### *Diagnosis of extrinsic carcinoma—*

The majority of new growths in the pharynx are malignant. Although cysts, fibromas, and lymphangiomas are not uncommon on the edge of the epiglottis, any growth here, still more, any tumour on the posterior surface of the larynx, must be viewed with grave suspicion. The characteristics of innocent growths here are, smooth surface, well defined outline and slow growth. There is no fungation or ulceration, unless after an unsuccessful attempt at surgical extirpation of the growth.

In the post-cricoid epithelioma of women, there is often a history of slight dysphagia for a long time preceding the onset of malignant disease.

### **Prognosis**

The average duration of life of cases of untreated carcinoma varies in the three classes of laryngeal cancer. The longest duration is in intrinsic cancer (3 to 7 years) and the shortest is in extrinsic (6 to 18 months), the subglottic is midway between the two.

### **Treatment**

#### *Prophylaxis—*

It is impossible to do very much in the way of prevention of cancer, in as much as its cause is unknown. But the advanced and hopeless stages of cancer can be prevented. The most important means towards this end is to

bring about a full realisation on the part of the public and of the general practitioners that chronic or intermittent hoarseness of voice of even only a few weeks' duration means cancer, until it is proved otherwise by every diagnostic means possible

### *Curative treatment—*

There are three methods of curative treatment —

A Operation—  $\left\{ \begin{array}{l} 1 \text{ Laryngofissure} \\ 2 \text{ Laryngectomy} \end{array} \right.$

B Irradiation

The dividing line between cases suitable for laryngo-fissure and laryngectomy, respectively, is quite clear. Similarly irradiation is definitely indicated in extrinsic cancer of grades III and IV, and in cases where any major surgical operation is contra-indicated because of the presence of active pulmonary tuberculosis, myocardial degeneration, cirrhosis, etc. So far as the treatment of extrinsic growths of groups I and II with or without metastatic glands in the neck is concerned, there is room for some difference of opinion.

The selection of the treatment for the particular case depends on the following factors —

#### (a) Local factors—

- (1) Location of the lesion
- (2) Extent of the lesion
- (3) The degree of malignancy
- (4) Evidence of metastasis
- (5) Antecedent operation
- (6) Antecedent irradiation

#### (b) General factors—

- (1) Physical condition of the patient in terms of operative risk
- (2) The age and physical condition of the patient as an index to life expectancy apart from cancer
- (3) Consent to operation

#### 1 Laryngo-fissure—

The operation affords access to the interior of the larynx by splitting the thyroid cartilage.

The operation of laryngo-fissure has advanced to the point where 82% of cures can be obtained provided the operation is strictly limited to cases of early intrinsic carcinoma of the larynx of limited extent. In all of the cases in which laryngo-fissure is inadequate laryngectomy gives good results. With intrinsic cases, no more to be considered early, *i.e.*, with fixation of the vocal cord, encroachment upon the ventricle or involvement of the anterior commissure, where laryngo-fissure has been done cure has been obtained in as much as 45% of the cases. No better results are obtained by laryngectomy.

*Indications for laryngo-fissure—*

- (a) Intrinsic cancer of limited extent, irrespective of the grade of the growth (*i.e.* degree of malignancy)
- (b) When the anterior wall of the arytenoid eminence is involved, even though the tumour has not become extrinsic, laryngo-fissure should be done if the grade is I and II and laryngectomy if it is III and IV
- (c) Intrinsic carcinoma involving the anterior commissure can be well treated by Chevalier Jackson's modified laryngo-fissure

Formerly, carcinoma in the anterior commissure was deemed suitable only for laryngectomy even when they were small, because the technique of operation then included the division of the tumour in the splitting of the thyroid cartilage.

*Indications for laryngectomy—*

- (a) Intrinsic carcinoma of the larynx that has extended so far posteriorly that laryngo-fissure is inadequate, especially if the carcinoma is graded III and IV
- (b) Intrinsic tumour with subglottic extension
- (c) Subglottic carcinoma
- (d) Extrinsic carcinoma of grades I and II
- (e) Recurrence after laryngo-fissure
- (f) When with a fixed vocal cord the disease extends to the arytenoid, ventricular band or the epiglottis
- (g) When the thyroid cartilage or the crico-thyroid membrane has been invaded
- (h) When the disease has involved the whole of one and one half of the opposite vocal cord,

*Preparation of the patient for operation—*

- (a) The hygiene of the oral cavity, the gums and teeth, the paranasal sinuses and tonsils are attended to if necessary. Any extraction or filling of carious teeth is done at least a fortnight or 3 weeks before the operation is undertaken.

Dental sepsis must be attended to with greater care in total laryngectomy than in cases of laryngo-fissure. In the latter the functions of deglutition and coughing are both still present to guard the larynx, while in the former operation, they are completely absent and any buccal pus trickles down to lodge in and infect the pharyngeal wound. All bad and doubtful teeth should be extracted.

- (b) Psychic preparation—

Comforting and assuring the patient if possible by showing earlier good results and by showing him that even the loss of the voice can be made up by an artificial larynx.

**Preliminary medication**

All preliminary treatment with opiates and atropine must be avoided. If atropine is given it produces uncomfortable dryness and thirst. Any opiate dulls the sensitiveness of the air passages and weakens cough, thus increasing the chief risk, *viz*, the descent of blood and septic secretions into the bronchi. There are others (C J) who are of the opinion, however, that morphia or barbiturates could be given one hour before the operation without harm. By the time the air passages are opened, the effect of morphia wears away and the 'watch dog' of the lungs is ready again to do its work.

**Anaesthesia**

General anaesthesia is quite unnecessary for laryngo-fissure. It is a better practice to use local anaesthesia, with 1% novocaine for all preliminary work until the cartilage is exposed. Then through an incision in the crico-thyroid membrane packs soaked in 10% cocaine or 1% percain are introduced into the larynx.

St Clair Thompson states that local combined with general (chloroform) has been very satisfactory. We have followed this method.

**Laryngo-fissure**

The operation as done by St Clair Thompson is through a mid-line incision. After securing complete haemostasis of the skin wound, he pro-

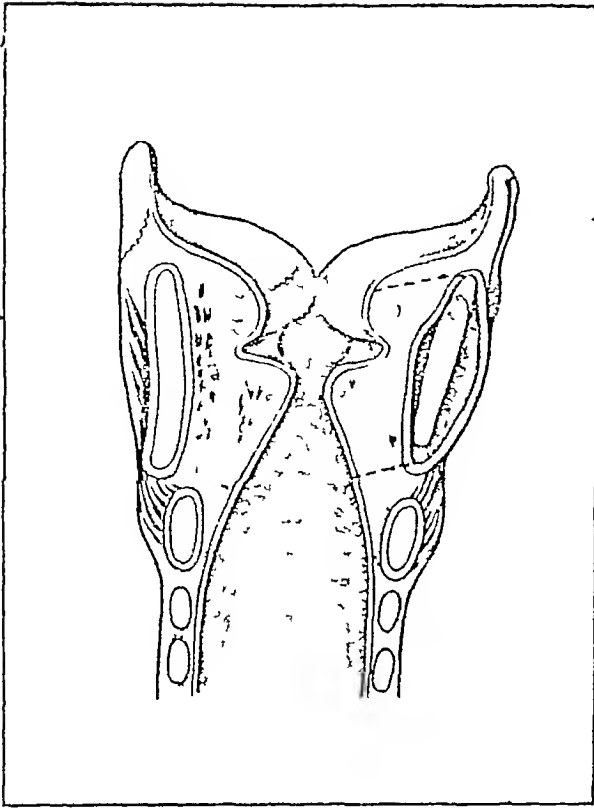


Fig 1 Laryngo-fissure for removal of Intrinsic Cancer, amounting to hemilaryngectomy, i e., one piece removal of all tissues including inner perichondrium on one side

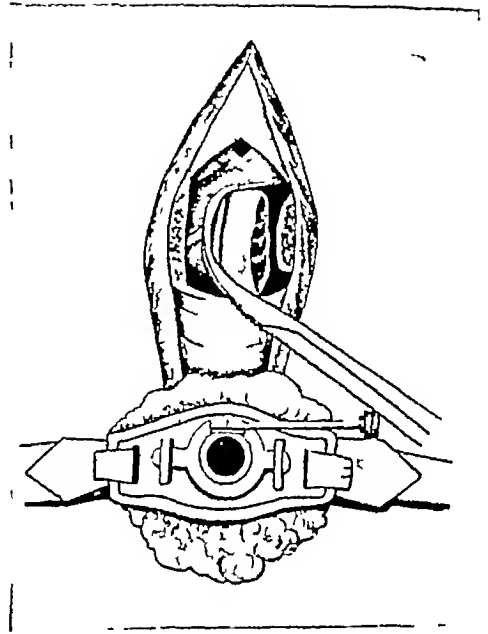


Fig 2 Laryngo-fissure—after separating the tissues along with inner perichondrium and after removal of thyroid cartilage wing—reaching back upto level of vocal process of arytenoid—removal in one mass

ceeds to do a tracheotomy The upper 2nd, 3rd and 4th rings of the trachea are exposed and to do this, the isthmus of the thyroid gland is divided between two haemostats and ligatured Tracheotomy is done through the 3rd and 4th rings and a portion of the tracheal ring is excised so as to leave a round opening through which a good sized tracheotomy tube is inserted If general anaesthesia is necessary light chloroform vapour could be insufflated through this tracheotomy

There can be no objection to the performance of a tracheotomy It can be deliberately done and is free from danger It facilitates the administration of general anaesthesia It adds no risk, on the contrary, it makes for safety and is necessary if one wishes to prevent the great danger of the descent of blood into the bronchi

After splitting the thyroid cartilage, opening the larynx and plugging the trachea, the further steps consist of excision of the wing of the thyroid cartilage on the affected side, after elevating both internal and external peri-

chondria With the wing or a large part of it removed, better access for excision of the growth is afforded and internal healing is more rapid The growth is then excised and haemostasis secured

Advantages of this method are —

- (a) It gives free access to the field of operation and facilitates complete excision of the growth
- (b) It allows of more satisfactory haemostasis
- (c) It promotes quicker healing of the endo-laryngeal wound
- (d) Secures a more satisfactory air way
- (e) Avoids necrosis of the cartilage

*Modified Laryngo-fissure* (Chevalier Jackson)—

- (a) Preliminary medication
- (b) Anaesthesia
  - (1) Local anaesthesia in front mid-line of neck
  - (2) Division of soft tissues in mid-line down to the thyroid cartilage
  - (3) Ligaturing bleeding points
  - (4) Incision of the crico-thyroid membrane
  - (5) Local application or submucosal injections of anaesthetic solution to the interior of the larynx through the incision in the crico-thyroid membrane
  - (6) Incision of external perichondrium
  - (7) Sawing through the thyroid cartilage
  - (8) Sub-perichondrial dissection on the side of least involvement
  - (9) Incision through normal tissues well-behind the back of the growth and inspection of the interior of the larynx
  - (10) Sub-perichondrial dissection backwards on the involved side
  - (11) Excision of growth with a wide margin of normal tissue
  - (12) Haemostasis
  - (13) Anchoring forward of ventricular band and stump of vocal cord if desirable
  - (14) Closure of fascia and muscles
  - (15) Closure of the skin and dressings

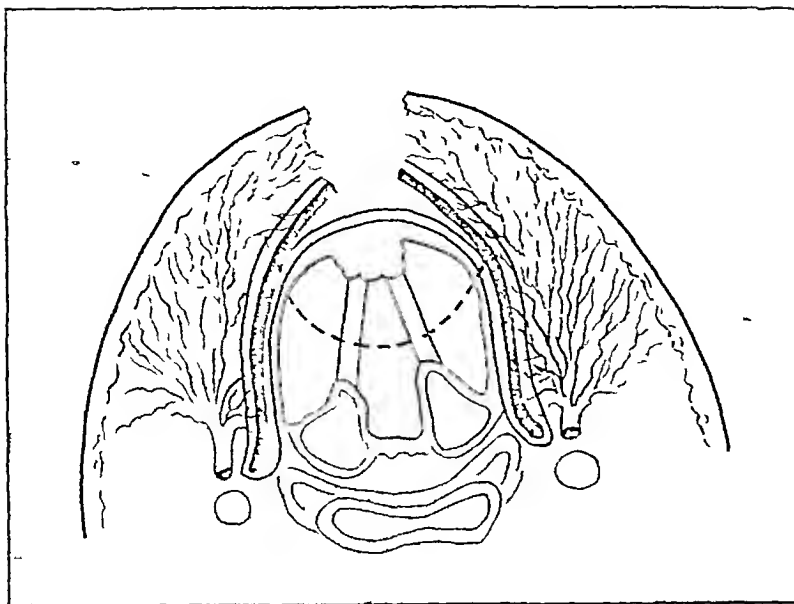


Fig 3 Laryngo—fissure—for growths involving ant commissure—  
as the cartilage angle is to be preserved—scrupulous care is  
taken not to disturb ext perichondrium and so ensure  
blood-supply to the angle Separation of inner  
perichondrium on either side to reach  
beyond the growth

#### Differences—

- (a) Chevalier Jackson does not open the trachea throughout the operation. He does tracheotomy only if there is troublesome post-operative bleeding from the endolarynx.
- (b) Does not excise the ala of the thyroid cartilage.
- (c) Does not cut the anterior commissure along with the division of the thyroid cartilage in the mid-line.
- (d) After cutting through the external perichondrium he saws through the thyroid cartilage and then he does the sub-perichondrial separation. The larynx is opened on the less affected side, cutting through the healthy tissue and the growth is excised under direct vision leaving 1 c.m. of healthy margin around.

The advantage of this modification of Chevalier Jackson is that, growths involving the anterior commissure which were formerly treated by laryngectomy could by this method be treated with laryngo-fissure and thereby the larynx is preserved.

#### Complications—

- (a) Bleeding
- (b) Chest complications
- (c) Necrosis of cartilage.

*Sequelae—*

The internal wound heals slowly. It takes about six weeks for granulations to appear at the site of operation and about three months before healing by epithelialisation is complete.

*Appearance of granuloma—*

During the process of endo-laryngeal healing sometimes a well marked granuloma appears. Such granulation tissue has to be distinguished from a recurrence. A distinct granuloma is seldom noticed before the third week and does not start later than the eighth week. When well defined and semi-pedunculated it is better to remove it and microscope it to prove its innocent character. This allays anxiety and also hastens the recovery of the voice. If the granuloma to the naked eye is innocent and is seen to be shrinking when inspected at intervals, it is left alone and ultimately disappears.

*Necrosis of cartilage—*

(a) Tracheal ring

(b) Edge of the divided ala of the thyroid cartilage. This is uncommon, but is sometimes seen to occur, when the ala of the thyroid cartilage is not removed, or when an oval window is not cut in the tracheal rings.

*Recurrence—*

(a) Locally, (b) in lymphatic glands, (c) in other regions of the body

(a) *Local*—Appearance of disease within twelve months indicates an incomplete removal and recurrence of disease locally is most likely within the first 12 months.

(b) *In the glands*—While the larynx may remain free from disease, carcinoma may develop in the lymphatic glands. This may occur several years after the first operation. These glands can be successfully operated on and the field radiated.

**Laryngectomy**

There are two types

(a) Narrow field laryngectomy (b) Wide field laryngectomy.

(a) Narrow field operation is suitable for intrinsic disease without perichondrial involvement and without lymphatic metastasis, i.e., when the intrinsic growth has been neglected and has not only caused fixation of the vocal cord but has encroached upon the surrounding free lymphatic drainage area.

- (b) Wide field operation is suitable for cases
- (1) with involvement of perichondrium
  - (2) with palpable lymphatic metastasis
  - (3) extrinsic carcinoma of grades I and II
  - (4) recurrence after laryngo-fissure

*Preparation of the patient—*

This has been already mentioned. In addition it should be mentioned that patient's blood grouping is done and blood is kept ready for transfusion, when required. In patients who are already run down in health, one or more blood transfusions are given before subjecting the patient to the operation of laryngectomy.

*Anaesthesia—*

- (a) Local infiltration + block anaesthesia  
(paravertebral cervical block)  
+ regional
- (b) Local combined with general is the best in our opinion.  
General anaesthesia is commenced from the moment the trachea is opened until the hypo-pharynx is closed.

*Narrow-field laryngectomy—*

In addition to other investigations, before undertaking the operation of laryngectomy, the patient must be subjected to direct laryngoscopy and oesophagoscopy for examination of the hypopharynx and cervical oesophagus for primary malignant lesions and also for glandular metastasis visible oesophagoscopically but not palpable externally. Such cases where glandular metastasis are found oesophagoscopically are not suited for laryngo-fissure or laryngectomy, but should be treated by radiation.

- (a) Incision—mid-line from the upper border of the hyoid bone to the jugular notch. The incision is deepened until the thyroid and cricoid cartilages are exposed. The thyroid isthmus if bulky is divided and ends closed by stitching. Upper three tracheal rings are exposed.
- (b) Skeletonization of the larynx—The object of this step is to remove the larynx and as little else as possible. The muscular insertions are separated from the perichondrium as close to the cartilage as feasible. The infra-thyroid muscles are not excised.

- (c) Ligature of the laryngeal arteries and insertion of the canula
- (d) Opening of the pharynx and lifting off of the larynx
- (e) Closure of the pharynx The needle must not perforate the mucosa  
Before closing the pharynx a stomach tube is passed through the nose to be retained for 10—12 days after operation
- (f) Amputation of the larynx from the trachea—The best tracheal-stoma is made by the whole or a ring like horizontal slice of the cricoid cartilage, whenever possible
- (g) Anchoring the trachea to the skin

*Care of the tracheotomy canula*—is of primary importance\* The canula is worn in the stoma until healing is complete It must be a neat fit that does not cause pressure but not so loose as to permit secretions to come out around it The inner canula is changed every hour or so, and the outer one is changed every 8 hours

#### *Wide-field laryngectomy—*

The question of a two-stage or a one-stage operation The modern tendency in surgery is to perform an operation in one act, whenever possible A preliminary tracheotomy has no value in itself and should only be done if the patient is already threatened with asphyxia, or if the stenosis of the larynx has reached a stage at which the patient is so exhausted that he would not survive a radical operation without it

A further objection to preliminary tracheotomy is that the canula itself and the scar tissue around it, both obscure anatomical relations and prevent a clean dissection

These difficulties may be minimised, if the preliminary opening into the air-passage is unavoidable, in the following ways —

- (a) If the growth does not extend below the vocal cord, a laryngotomy through the crico-thyroid membrane may be substituted for tracheotomy
- (b) If the growth is subglottic—the isthmus of the thyroid gland may be divided and the tracheotomy is done as low as possible and a circular window is cut in the trachea which will avoid irritation due to the canula,

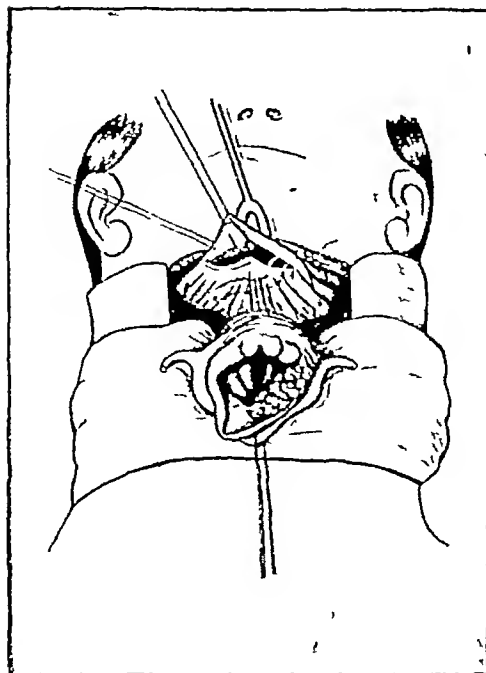


Fig 4 Laryngectomy-by broad-field method Dissection from above downwards—larynx separated from its upper & lateral attachment—pharyngeal wall continuity restored before removing of larynx from trachea below.

*Laryngectomy wide field proper—*

- (a) Anaesthesia local and general
- (b) Incision—dissection of flaps
- (c) Cutting away the anterior muscles
- (d) Ligation of the upper and lower laryngeal vessels
- (e) Search for lymph nodes under the sternomastoid muscles
- (f) Liberation of the larynx
- (g) Opening into the pharynx—through the thyro-hyoid ligament
- (h) Lifting the larynx from and out of the wound and introduction of feeding tubes
- ..
- (i) Closure of the pharynx
- (j) Severing the larynx from the trachea
- (k) Anchoring the trachea to the skin
- (l) Closure of the wound and insertion of drains and application of dressings

*Incisions—*

We have found the horizontal H shaped incision to be the best—the nutrition of the skin flaps are better kept in this form than in the other ones.

The next best is the V shaped one

The canula of Prof Moure, *i.e.*, modified "Lombard's canula" is of great use in keeping separate the dressing on the neck from that around the tracheal orifice into which the cervical part fits closely. The prolongation in front of the deeper shield carries all secretions away from the wound, while the superficial shield prevents the dressings in the neck from shifting over the opening of the canula.

Resumption of deglutition—from 10th to 15th day and sometimes earlier, depending upon whether any leakage has occurred from the pharynx, and the patient may begin to swallow without the aid of the tube.

Should a fistula form, it can be packed up with a little gauze during the act of swallowing. A fistula forming thus closes spontaneously in two to six weeks. Where a fistula is persistent, a plastic operation is required to close it.

**Complications and sequelae**

- (a) Broncho-pneumonia
- (b) Infection of the wound
- (c) Secondary haemorrhage
- (d) Fistula formation.
- (e) Perichondritis of tracheal rings
- (f) Stenosis of the tracheal opening
- (g) Sloughing of the tracheal mucosa

*Pharyngostome—causes—*

- (a) Defective nutrition of the skin flap due to previous irradiation
- (b) Infection of the wound is the principal cause of the formation of pharyngostome
- (c) It may arise from insufficient pharyngeal wall to render closure of the pharynx possible. This may arise from extensive involvement of the pharyngeal wall and as a result primary closure of the pharynx is not possible without undue tension on the suture line. Under such circumstances, we make a pharyngostomy at

the time of the operation intentionally, as advocated by Postman. It has the added advantage of sealing up the tissue planes from the possibility of leakage, and thereby primary healing without cicatrization results.

After the wound has completely healed after laryngectomy, it is advisable to expose the lymphatic area of the neck to deep X-ray irradiation.

### Effects of loss of larynx

- (a) As the air is not passing through the nose, it lacks the warming, moistening and filtering of the nasal passage.
- (b) The sense of smell is impaired and patient is unable to blow his nose.
- (c) The absence of a check valve against ingress of water renders the patient unable to participate in swimming and diving activities, and exposes him to the danger of inhaling insects, dust and other foreign bodies.
- (d) The loss of the laryngeal air valve involves loss of thoracic fixation, rendering the patient disabled for heavy manual labour.
- (e) Loss of phonation.

### *Articulate speech after laryngectomy—*

In spite of the loss of the larynx, when some fold of mucous membrane is made to vibrate, some acquire a serviceable pharyngeal voice (especially when there is left behind enough of pharyngeal wall after operation) which may be of such quality that there is little disability. This could be further improved if the patient learns to swallow air, which could act as a reservoir for continued speech.

When the patient cannot acquire the habit of air swallowing he can still have speech by means of artificial articulate larynx.

We have been able to give a serviceable artificial larynx to one of our patients by using the tuning reed for a musical instrument, as a sound box.

### Indications for irradiation

- (a) Those cases in which for any reason laryngo-fissure and laryngectomy are both contra-indicated,

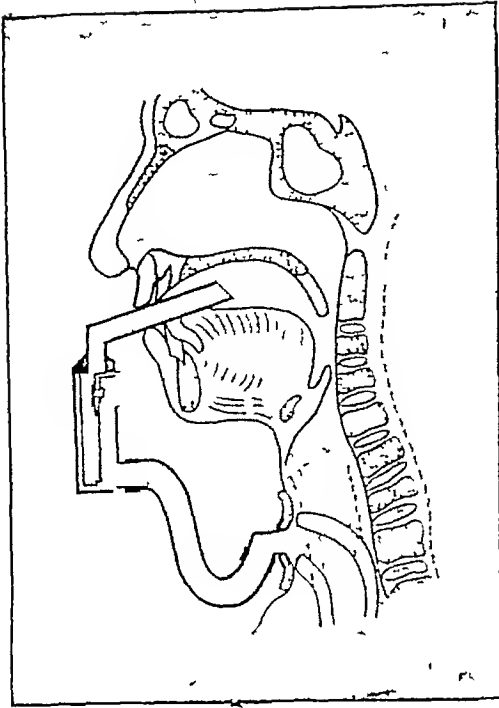


Fig 5 Schematic illustration of Artificial Larynx perfected by Bell Telephone Co. The heart of the apparatus is the sound-box. We have been successful in contriving a cheap home-made Artificial Larynx by using the tuning-reed used for tuning musical instruments easily available in normal times and costing Re 1

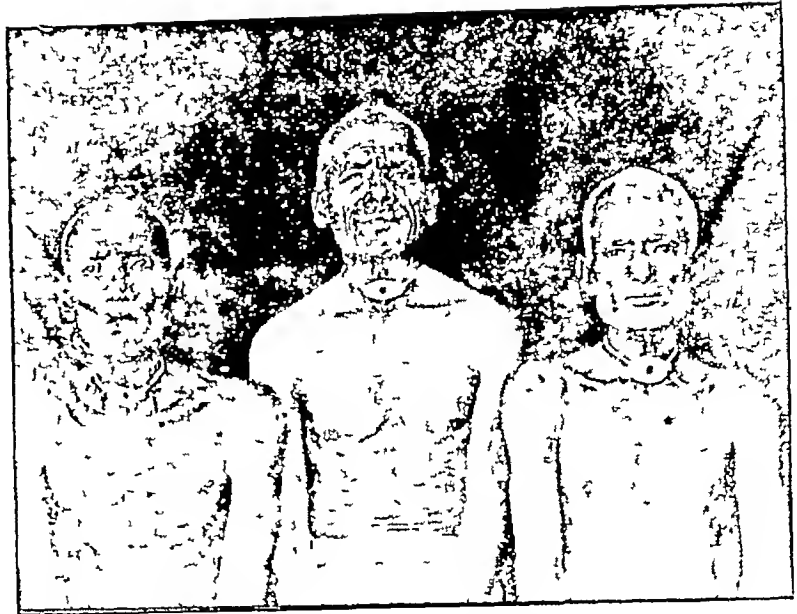


Fig 6 Last 3 Consecutive cases of Laryngectomy, just before being discharged from the wards of the K. E. M. Hospital

- (b) Patients with organic disease elsewhere, high and irreducible hypertension, cardiac and renal disease, tabes, paresis, mental disorder, severe diabetes, hemiplegia and pulmonary tuberculosis
- (c) Bad alcoholics
- (d) In patients with life expectancy shorter than that of their age, treatment by irradiation would be preferable to laryngectomy
- (e) Extrinsic cancer of groups III and IV, by origin or extension.
- (f) Cases of carcinoma involving the cervical oesophagus
- (g) Patients with mediastinal metastatic lymph nodes

A positive diagnosis is just as necessary for treatment by irradiation as for treatment by operation. The amount of irradiation required may make the patient more uncomfortable than he would be in the post-operative

period following even a total laryngectomy Great care must be taken not to injure the laryngeal cartilages by over-dosage

#### *Recurrences after irradiation—*

They are not suitable for irradiation again At the same time they become bad surgical risks Even palliative tracheotomy may be complicated by a widening sloughing necrotic area, that never heals

We have no experience of using radium as a therapeutic agent for cancer of the larynx

### **Palliative Measures**

Cases may be so advanced, that neither the surgeon nor the radiologist want them In badly advanced inoperable cases treatment by any form of radiation is more likely to aggravate the symptoms than give relief and in some cases may accelerate the progress of the disease

“Thou shalt not kill, but needst not strive officiously to keep alive”

—*St. Clair Thomson*

The means are—

(a) Keeping the throat clean and free from foetor—

(1) Repeated gargles with Condyl's and soda bicarb lotion.

(2) Glycerine of thymol and dilute carbolic acid flavoured with Eau-de-cologne are useful mouth washes

(b) Relieving pain—by aspirin and opiates

(c) Preventing suffocation by tracheotomy

(d) Preventing starvation by gastrostomy

Before closing we would like to draw your pointed attention to the fact, that our experience does not bear out the accepted view about intrinsic cancer of the larynx being twice as common as the extrinsic We feel that extrinsic cancer is much more common than intrinsic Our series of 325 cases, contain only 15 which could be called intrinsic and requiring laryngofissure All the remaining 310 cases were extrinsic

TABLE III

**Grading (done in 44 cases)**

Grade ...	I	II	III	IV
	1	27	12	4

TABLE IV

**Laryngo-fissure 4 cases (1 turned out to be T B )**

No operative mortality

3 Cases could be traced upto 1 year only —No recurrence

1 Case died of hemiplegia—6 months after operation

**Laryngectomy 32 cases**

Operative mortality	...	15
Recurrence	...	3
Alive to-day	..	14
1 yr after operation	...	3
2 yrs after operation		2
Over 3 yrs to		
11 yrs	...	9

TABLE V

**Cause of Operative Mortality**

Broncho pneumonia	...	4
Lung. Haemorrhage	...	2
Gradual sinking	..	7
Sepsis	...	2
		<hr/>
		15

TABLE VI

**Total number of Laryngeal Carcinoma since 1937**

O. P. D	..	184
In-pts	...	86
Deep Ray.		49
Private Cases	..	13
Intrinsic (G )	..	4
" (J )	...	2
Extrinsic (G.)	...	5
" (J )		2

332 (Including 7 post-operative radiation )  
 Otherwise 325 cases—15 Intrinsic  
 and 310 Extrinsic

TABLE VII  
Classified according to treatment

Laryngo-fissure	4
Laryngectomy (two narrow field and two pharyngotomy) . .	32
Palliative tracheotomy	33
„ gastrostomy	8
	<hr/> 77

### Our Results

#### *Laryngectomy*

Advanced intrinsic .	18
Extrinsic ...	77
	<hr/> 95

27 cases living 3 yrs. and over *i e*, 36%, Advanced intrinsic 44%,  
Extrinsic 22% (6 out of 27)

#### *Radiation*

17 cases 4 cure 3 yrs. and over *i e*, 24%

Advanced extrinsic (all but two) 32

Recurrence 3 cases

Alive to-day 3 yrs. and more 9 cases *i e*, 38%, if recent cases are not considered.

Alive for 2 yrs 2, Alive for 1 yr. 3

We realise that our clinical material is derived mainly from a general hospital attendance and that most of the poor illiterate class are unmindful of their troubles and drift along till they can drift no further and thus may allow a primary intrinsic growth to become extrinsic. However, by careful history taking and examination of the lesion, we do not find that the extrinsic lesion began with intrinsic and had later, because of neglect, become extrinsic, and so we hold, that even after allowing for intrinsic becoming later on extrinsic, there is still left a large percentage of cases primarily extrinsic and this has its serious bearing on progress, treatment and cure. We cannot say why this is so.

Our results compare but poorly with those of European and American clinics. Their operative mortality for laryngectomies varies from 5 to 10%

whereas ours has been 47% (by operative mortality we mean death within one month of the operation) But this obviously high mortality in our series may be partly due to our limited experience, at the same time, all but two of our cases for laryngectomy, were laryngo-pharyngeal growths which, according to their standard, would have been considered too advanced to be operated at all, and would have been subjected to irradiation therapy alone. However, because 62% of these cases were of Grade II, and consequently not so radio-sensitive, we have elected to give the patients the chance of operative cure, and considering that apart from the risk of an operative-mortality of 47%, of the remaining 17 cases, only 3 died of recurrence, *i e*, 44% operative cure for three years and over resulted, we submit that it is worth while taking this risk

We were guided and inspired by the work of Sir St Clair Thomson, Chevalier Jackson and Pack's New York Memorial Hospital volume, to all of whom we gratefully acknowledge our indebtedness. We are also indebted to the Pathological Department, KEM Hospital, Bombay, for their ready co-operation in reading and grading the biopsies of our cases, and to the Dean of the KEM Hospital, for allowing us the use of the hospital-records in preparing this paper. And also, we cannot forget, the laborious work of our House-Surgeon, Dr Hiranandani, in compiling the various statistics

## DISCUSSION

### DR KINI

Dr Kini observed that the tale of cancer in India was a tale of woe as very few cases came for treatment in the early stages of the disease. He also observed that he, being a general surgeon, had no opportunities of treating laryngeal carcinoma on a large scale, but had one case referred to him by the Laryngologist (Dr M. N. Prabhu). It was an intrinsic cancer of the larynx and the growth was of the nodular type. On examination by direct laryngoscopy, keratinised patches could be seen from the nodular growth. The patient first refused operation but as he was waiting he developed obstructive symptoms when a tracheotomy was performed by the Laryngologist to relieve the obstruction in breathing, and after relief of this obstruction he consented for the operation. Laryngo-fissure operation was done along with removal of part of the thyroid cartilage. Glands were found enlarged but they were not removed. The whole operation was done under local anaesthesia and the laryngeal raw surface was smeared with Streptocide and the wound was sutured in layers with a gauze drain in the most dependent part of the wound and removed at the end of four days. The patient recovered his voice to a whisper at the end of a week. He was sent for deep X-ray treatment for the glands. As he was undergoing this treatment, he developed acute oedema of the larynx and the tracheotomy had to be done again. The patient is alive 11 months after the operation.

Dr Kini asked the lecturer why biopsy should be done in every case. He also asked why it was not possible to correlate the clinical picture with the histological picture.

## DR B TIRUMAL RAO

The number of cases seen by me of this disease is small and my experience limited. If I am taking part in this discussion, it is because that laryngologists should agree to publish their cases if progress is to be made

It is the discovery of the laryngoscope in the year 1855 that laid the foundations for the accurate study of laryngeal carcinoma. It is possible that the disease is also increasing in its incidence. And yet it is a rare disease as compared to the incidence of carcinoma elsewhere. Out of the total of 1,499 admissions for malignant tumours, during the years 1936-'40, into the King George Hospital, Vizagapatam, 2% were for laryngeal or laryngo-pharyngeal carcinoma and 4% were for carcinoma of stomach and oesophagus—figures which agree very closely with the English statistics except for the fact that the incidence of gastric carcinoma is as high as 21% in England and 65% in Czechoslovakia.

*Classification—*

Krishaber's classification, proposed nearly half a century ago, of laryngeal carcinoma into extrinsic and intrinsic and mixed, has served to separate a group of growths confined to the interior of the larynx, of slow progress and late metastasis and more amenable to treatment, from those arising from the margins and posterior surface of the larynx, of insidious onset, rapid progress and early glandular metastasis. But there is a lot of confusion regarding the interpretation and application of these terms. I personally prefer the classification proposed by Sir St Clair Thomson in 1929, which is also in accordance with the views of Trotter and American authorities like New, Figi, Macready and others. Sir St Clair Thomson says that carcinoma rarely originates in the ventricular bands or the inter-arytenoid regions but that the ventricle and the sub-glottic regions do give rise occasionally to malignant growths and therefore suggested the term 'Laryngeal' carcinoma to manifestations of this disease around the glottis and the term 'Hypo-pharyngeal or Laryngo-pharyngeal' carcinoma for those manifestations hitherto vaguely grouped as extrinsic carcinoma of the larynx. In 1939 Thomson described carcinoma of the epiglottis as a separate entity, a separation which I think is not very essential.

*Etiology—*

The number of patients during the last fifteen years that have come under my care is only 75, 12 of whom were laryngeal and 63 were laryngo-pharyngeal. 6 cases appeared, however, to have been laryngeal to start with and spread by extension into the laryngo-pharynx. These may be called the 'Mixed' group according to the older classification. This marked preponderance of laryngo-pharyngeal over laryngeal carcinoma (57/18) is at considerable variance with the experience of the great Western authorities. But their figures were mainly taken from their private cases, and hospital statistics even in the West show the same preponderance of laryngo-pharyngeal over the laryngeal carcinoma. Here is one instance out of many others. "In Philadelphia General Hospital not one was limited or suitable for a laryngo-fissure in a series of 75 cases" (Cited by St Clair Thomson).

As regards age incidence of the disease, the maximum in my series is the fifth decade of life in males and the fourth in females. This shows that the incidence is earlier in India than in U.S.A. where the maximum incidence is in the seventh decade. This may perhaps be explained as due to the shorter expectation of life in India. The earliest age at which the disease was discovered in this series was at 20, two cases of carcinoma of the post-cricoid area, one in a male and the other in a female, both of which were confirmed histologically.

*Sex*—37 of the cases were males and 7 were females, excluding the post-cricoid cases. This preponderance of incidence in males agrees with the statistics of Drs Joshi and Gandhi. But the incidence of post-cricoid carcinoma is not only very high but also found to be equal in males and females (men 15, females 16). This is in direct contradiction to the accepted teaching based upon western statistics that it is seven times more common in females than in males. The preponderance of high oesophageal carcinoma in Chinese men has been sought to be explained by the fact that they eat rice, their staple diet, when it is hot as men are served first. Could this or a similar explanation serve to explain the high incidence of post-cricoid carcinoma in Southern Indian men?

Extrinsic factors like vocal abuse, alcohol, and particularly smoking, seem to have some etiological influence. In Vizagapatam, where people of both sexes are in the habit of smoking more often with the lighted end of the cigar inside the mouth, the incidence of leukoplakia and carcinoma of the palate is very high—a fact to which Dr Kim will testify. The experimental study of Flory gives almost conclusive proof of the carcinogenic properties of tobacco-smoking (Lancet 1941 ii, p 78).

#### *Pathology—*

The site of origin of the lesion in the laryngeal cases is as follows —

- Vocal cord—2
- Ventricular bands—1
- Subglottic—2
- Undetermined—7

One of the subglottic growths was verified post-mortem as a secondary to a malignant growth of the thyroid.

The site of origin of the laryngo-pharyngeal growths in this series is as follows —

- Post cricoid—31
- Pyriform fossa—7
- Epiglottis—3
- Undetermined—22

Histological findings were obtained in 5 laryngeal and in 18 laryngo-pharyngeal cases.

#### I Laryngeal carcinoma—

- Squamous celled carcinoma—3
- Malignant papilloma—1
- Secondary to malignant growth of the thyroid gland—1

#### II Laryngo-pharyngeal carcinoma—

- Squamous celled epithelioma—15
- Epithelioma suggestive of origin from a papilloma—1
- Carcinoma of bronchogenic origin—2

#### *Diagnosis—*

Enough stress has been laid upon the significance of hoarseness of voice as an early symptom of laryngeal carcinoma but it is seldom taken heed of, being such a common symptom in diverse minor ailments of the larynx,

In cases where the disease is advanced and appearances typical and syphilis and tuberculosis are definitely ruled out, the need for a biopsy has not been felt, but it was resorted to whenever and wherever it was found necessary. I wish to record here that biopsy in a septic canal like the hypo-pharynx is not absolutely safe, breaking as it does the epithelial barrier, however carefully and aseptically performed. A Hindu male aged 35 years in good general health developed cellulitis of the neck and septicaemia after the removal of a small piece from the hypo-pharynx. Such disasters are fortunately rare but should be borne in mind.

In cases where biopsy of the primary growth was not successful, secondary deposits were found histologically in the cervical glands in 2 cases, and radiologically in the lungs, in one case.

#### *Treatment—*

Of the twelve laryngeal cases only two were considered suitable for the operation of laryngo-fissure but both the patients refused operation. One patient came with severe dyspnoea necessitating an emergency tracheotomy and on subsequent irradiation with three radium needles implanted into the growth (1,285 mgm hrs) the growth regressed considerably but the vocal cord still appeared diseased. Six weeks later a laryngo-fissure was done and the thyroid ala and the tumour mass excised. The patient was seen to be in very good general health one and a half years after operation but to a recent enquiry there is no reply\*. In the rest of the cases laryngectomy was indicated but they refused to have it.

In a case of laryngo-pharyngeal carcinoma of the post-cricoid area, a female of 40 years of age, a lateral trans-thyroid pharyngotomy was done. She was quite well and progressing excellently when one night in a fit of mental depression she pulled out the tracheotomy and the stomach tubes without the notice of the night nurse and died.

Irradiation is the method of choice in treatment of cases of carcinoma of the laryngo-pharynx. Most of the cases came so late to the hospital that no more than palliative treatment could be given.

Two of the 25 cases treated by irradiation with radium, showed complete relief from all signs and symptoms at the time of discharge from hospital but could not be traced afterwards.

DR D R MEHR-HOMJI

We have all just heard a very interesting paper on laryngeal carcinoma by Drs Gandhi and Joshi, and must congratulate them on the excellent presentation of the subject.

It might interest you to know how we manage our cases of laryngeal cancers at the Tata Memorial Hospital. Out of a total of first 3,500 cases, we have had 240 cases of laryngeal cancers, constituting 6.8% of all cases seen. Of these 240 cases, there were 210 cases of extrinsic cancers, comprising 87.4% of all laryngeal cancers, and 30 cases of intrinsic cancers, constituting 12.6% of all laryngeal cancers. We classify our laryngeal cancer cases into extrinsic and intrinsic varieties according to Hayes Martin of Memorial Hospital, New York. We take as the line of demarcation, the free edges of the ventricular folds, so that all cancers developing on the vocal cords or in the ventri-

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\*Since returning home from the Conference, the reply to my enquiry has come stating that he is in a good condition of general health but his voice is still weak.

cles, are classified as intrinsic cancers, and all tumours developing on the upper surface of the ventricular folds or above, are grouped as extrinsic cancers

The exact classification into extrinsic and intrinsic cancers is of great importance in gauging the clinical course, and in the choice of treatment, because of the fact that cancer of the intrinsic larynx is usually well-differentiated, squamous carcinoma grades I and II, rarely gives rise to metastasis, is slow in growth, comparatively radio-resistant and, therefore, more suitable for surgical treatment. These growths can be extirpated safely by either partial or total laryngectomy, as the circumstances present. This does not mean that such lesions cannot be cured by radiation therapy, but it simply means that surgical treatment will give more cures, without any of the disadvantages of radiation therapy.

On the other hand, extrinsic laryngeal cancers are poorly differentiated, epidermoid carcinoma grades II, III or IV or anaplastic carcinoma. They are rapidly growing and give rise to metastases often early and usually bilaterally. These growths exhibit malignancy of a high degree, but are highly radio-sensitive, and hence they are better suited to radiation therapy.

There were a few important factors in the etiology which I would like to mention —

As far as the incidence is concerned, we were struck by the greater preponderance of extrinsic cancers than the intrinsic ones. Extrinsic cancers were seven times more common than the intrinsic group. This is quite contrary to the figures quoted in the literature. This difference may be due to the classification we follow, but we believe that the most important cause is that patients complaining of hoarseness, which is the first symptom in intrinsic cancer, will be referred by the local practitioners to throat surgeons, whilst, on the other hand, patients complaining of enlarged glands in the neck or difficulty in swallowing, or lumpy sensation in the throat, would be referred not to a throat surgeon but to a general surgeon or a cancer clinic. Apart from this, we believe that extrinsic cancers are more common than intrinsic ones in our country.

Secondly, we find that there is more laryngeal cancer amongst the Gujaratis than the Deccanis. One might think that this is due to the greater attendance of Gujarati patients as a whole, but it is not so, as the relative number of Gujaratis and Deccanis at our hospital is about the same. In fact, we have found that oropharyngeal cancer, behind the pillars of the fauces, is more common amongst the Gujaratis than amongst any other community. We are at present carrying on investigations as to why this is so, by going into questions of vitamin deficiency, errors in diets and habits, etc.

In the third place, abuse or excessive use of the larynx was found to be an important factor in our cases. 49.1% of our cases were required to make excessive use of the larynx. 22% of the cases were exposed to dust, smoke, etc. The rest of the factors in etiology threw no appreciable light.

It is our routine to perform a biopsy in all cases, before subjecting the patient to treatment. Drs Gandhi and Joshi have stressed the importance of biopsy in detail. One important factor which I wish to present with regard to biopsy is that, on many occasions, patients have been referred to us by eminent throat specialists with their diagnosis of laryngeal carcinoma, on clinical examination they did appear as such, but have been proved by repeated biopsies as inflammatory, and they have done wonderfully well with antiluetic treatment. Thus they have been saved from aggressive surgical or irradiation treatment. Herein lies the importance of biopsy in each and every case.

As regards the treatment, we have heard that Drs Gandhi and Joshi have been treating their cases by surgery predominantly, but I wish to emphasize the fact that radiation also plays a large and an important part in the treatment of laryngeal cancers.

As far as the selection of the method of treatment is concerned, we are not in any way influenced by the excellence of one or the other method. To quote Martin, "these methods need not be considered in a competitive sense, since each is clearly indicated in entirely different anatomic forms of the disease." We, therefore, believe that the best results are obtained by the proper selection of either surgery or radiation, or a combination of both.

Intrinsic cancers of the larynx are radio-resistant and hence better suited to surgery. We have had 30 cases of intrinsic cancers treated as follows —

17 cases by Surgery

5 cases by X-Radiation alone

2 cases by X-rays and Radon implantations

6 cases did not attend for treatment

Of the 17 cases treated by surgery, 9 were total laryngectomies alone, 7 were partial laryngectomies and 1 total laryngectomy, supplemented by X-Radiation. 24 patients thus had complete treatment, and 20 of them have been declared free of disease to date, for periods varying from 1 to 2½ years, thus giving a cure rate of 83.3%. Out of the 10 total laryngectomies, two died postoperatively of pneumonia. In one case total laryngectomy was performed for extrinsic cancer, and he developed nodes in the neck six months later, and these have been controlled by X-Radiation.

The indications and the technique of the operations have been explained to us by Drs. Gandhi and Joshi, but I would like to point out a few of the important details in the technique that we have learnt from experience. I may state that we have always performed narrow field laryngectomy for intrinsic cancers.

1 *Preliminary tracheotomy*—We have always performed a low tracheotomy 2 days prior to the main operation, in order that the patient may get accustomed to breathing through a tube.

2 *Local anaesthesia*—We have always used local anaesthesia, and never general anaesthesia. Morphine is never given. Nembutal grains in and injection of atropine are given prior to operation, as we believe that the immediate recovery of consciousness and of the cough reflex is an important factor in the avoidance of pulmonary complications.

3 *Drains*—The first three of our total laryngectomies were drained, the drains being removed on the third postoperative day, in the fourth case, we inadvertently forgot to insert the drain, and we got away without complications. Encouraged by this observation, we discontinued the draining of subsequent cases, and they did perfectly well.

4 In the early stages of our work, sutures for the repair of the pharynx included the mucous membrane flap obtained after removal of the larynx, the mucous membrane of the pharynx and a little of the under-surface of the sterno-hyoid muscle, as advocated by Crowe in his technique, so that when the sutures were tied, the muscle covered the line of incision and prevented leakage of saliva or food into the neck wound. We, however, found that all our cases developed fistula with escape of saliva. Probably this was due to too much tension on the sutures or due to muscular movements. In subsequent cases we did away with the inclusion of muscles and these patients never developed any fistula.

With regard to extrinsic cancers, we have had 210 cases, out of which 66 cases had no metastasis in the neck on admission, and 144 cases had neck metastasis, i.e., 68.5% of the cases had neck metastasis on admission.

The distribution according to anatomic sites is as follows —

Epiglottis	53 cases
Aryepiglottic folds and arytenoids	78 cases
Pyriform fossae	49 cases
Ventricular bands	11 cases
Post-cricoid	5 cases
Extensive (Extrinsic-Intrinsic)	14 cases
	<hr/>
	Total 210 cases
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These were treated either by X-radiation alone or by X-radiation and Radon implantation to neck nodes

84 patients had received complete treatment by radiation

78 patients did not attend for treatment

48 patients received incomplete X-Ray treatment

Of the 84 patients that received complete treatment, 25 are declared as having no disease, for periods varying from 1 to 2½ years, giving the figure of 29 7% cures, and 24 cases have shown good regression

You have noticed that Drs Gandhi and Joshi perform total laryngectomies for carcinoma of extrinsic larynx, and doubtless they have had some good results, but what one is interested in is, not some good results in a small group of cases, but as to what happens to a large series of cases if treated by surgery. Our figures show that 68 5% of cases had glandular metastasis on admission. Are these suitable for surgery? By no means

When one discusses the relative value of surgery or radiation as treatment for extrinsic laryngeal cancer, one is apt to forget that one operates only on early operable cases, while, on the other hand, radiation takes care of all cases whether early or late. Therefore, the results of operative treatments cannot be compared with the results of radiation. If only the early operable cases were radiated, the results of these would be infinitely better without mortality, morbidity and disability, as compared with the results of total laryngectomy, which carries with it in these cases of extrinsic cancer, a high mortality and a recurrence rate of more than 40%.

From this we see that if the results of both operable and inoperable cases of extrinsic cancers treated by radiation are not much inferior to the results of laryngectomy in early operable cases, there is no question that irradiation for the whole group of operable and inoperable cases of extrinsic cancers is the treatment of choice, as it leaves the patient with no mortality, a little morbidity and disability.

In conclusion, I would like to point out again, that as far as intrinsic cancers are concerned, surgery stands supreme but where extrinsic cancers are concerned, radiation in early operable cases will give much better results without any of the attending complications and disabilities of operations and, therefore, radiation is unquestionably the treatment of choice in all cases of extrinsic cancers, whether operable or inoperable.

The technique of radiation followed at our hospital is that of Coutard's Fractional Irradiation in a modified form. The importance of treatment lies in the administration of a cancericidal dose to the primary tumour and to its metastases, and in order to

maintain as far as possible the local and general tolerance, the effects of radiation must be limited to the area of the tumour itself. The radiation dose should be such that it is lethal to the tumour and tolerable by the patient, and therefore the volume of tissue irradiated should be strictly limited. The administrative technique should be precise. The central point of the tumour should be tattooed on the skin by ink, and only after thorough examination, should the centering of beam of radiation be finally decided upon. Patients should be examined daily after the first week of radiation, so as to observe the effects of radiation and to decide upon the period of treatment and the total dose to be given.

It must not be forgotten, however, that in radiation therapy, surgery has its definite importance. Tracheotomy may be required in some cases as a result of an increase in the local swelling from radiation, and in patients complaining of difficulty in swallowing from obstruction in the pyriform fossae, nasal feeding or even gastrostomy may have to be performed. Again, the question of Radon seed implantation may have to be considered at the time of completion of X-ray treatment.

At our hospital, the radiation therapists and the surgeons work in close co-operation, and the radiation therapy is administered to the fullest limits of a cancericidal dose with the confidence that any surgical complication arising will be promptly detected and dealt with.

#### DR K M RAI

We have listened to a very good paper by Drs Gandhi and Joshi on this subject of laryngeal carcinoma and its surgical treatment. Though it shows a personal triumph as regards their surgical skill in handling this very difficult problem—it is a pathetic story all the same with respect to the alleviation of the suffering of the large number of cases which presented themselves for treatment. Unless we eschew all vested interests—I mean vested interests in this sense—"that the choice of the best method of treatment requires complete freedom from bias for any particular form of treatment and the ideal choice can only be made if all forms of treatment are available and if the choice is made independent of the possession of an X-Ray machine or a quantity of radium or the possession of the necessary surgical skill and daring to perform major surgery"—I am convinced that we are not going to make any progress in successfully tackling the cancer problem. In the series of cases presented to-day, has this factor been considered at all? Out of the 200 and odd cases which presented themselves for treatment they have been able to operate on only about 25% of them. What has happened to the rest? Was radiation therapy either alone or combined with surgery considered as an alternative to surgery alone in these 25% of the operable cases? In my series of 62 cases of both epilaryngeal and laryngeal carcinoma treated at the Barnard Institute of Radiology, Govt General Hospital, Madras, during the last six years, the results are as given below. Cases of post-cricoid cancers have not been included in these figures because I think they should come under a separate category altogether.

#### No of cases treated—62

	Total	Sex - M F.	Age incidence	Average Age M F		Duration	Glands	Number successfully concluded treatment
Epilaryngeal	55	48 7	39—70	45	47	1 month to 1 year	in all cases	19
Laryngeal	7	7—	45—79	56	—	3 months to 1 year	—	5

An analysis of the figures show at first sight that it is also a pathetic story—but it should be remembered that all these cases were surgical outcasts.

The figures are in agreement with the observations of the Western workers with respect to the type, sex, etc., except that the age incidence is a decade earlier in the Indian, both in the male and female

Out of the 55 cases of epilaryngeal carcinoma, only 19 concluded the treatment, the rest having either stopped away from treatment without notice, or given up due to further complications arising due to the very advanced stage of the disease. All these 19 cases who were able to complete treatment went back with relief, but what the ultimate results are it is not known as it has not been possible to follow up these cases

Out of the 7 laryngeal carcinomata, i.e., intrinsic in type, only 5 concluded the treatment. Out of these,

- 1 is alive and well after 5 years
- 1 was alive for nearly two years, but had a recurrence after 18 months for which he was treated again for a second time
- 2 died at the end of the first year due to other diseases but were free from recurrence
- 2 stopped away before the course was finished
- 1 there is no trace—could not be followed up

If you take into account that these cases were considered as poor surgical risks and were therefore not operable the results are not at all discouraging, but as the series consists only of a small number of 5 cases it would not be scientific to draw any far-reaching conclusions from these. But there have been many workers in the field of X-Ray therapy, notable among them being Coutard. Out of the 77 cases of laryngeal growths treated by him and the result published some years back he obtained 32% of healing for a period of 2 years, which fell to 28% in five years and 27% in seven years

The history of the surgical treatment of laryngeal carcinoma shows very clearly how disastrous were the first attempts and how it took two generations of surgeons to develop and perfect the technique. Yet, though a percentage of patients are saved from certain death, consider at what cost—a great mutilating operation, with a considerable percentage of operative mortality, with permanent impairment of speech inspite of all the modern devices to overcome this disability, plus the other disabilities due to the presence of a permanent tracheotomy. The advocacy to give an equal chance to radiation therapy with surgery is an attempt to overcome the above deficiencies of surgery. It is inevitable to get poor results or a certain number of radionecrosis in radiation therapy when the technique is being first developed. The beginnings may be dark. It was certainly so in the case of surgery. It is neither scientific nor profitable to compare the results of surgery with those of radiation therapy for the very obvious reason that no one has ever tried so far to treat identical cases by the two methods and draw comparisons as to end results. I would very strongly put it to Drs. Gandhi and Joshi and other workers in the field to try this out. I feel confident that in the years to come it may be possible to show that radiation therapy—Telradium, high voltage X-Ray therapy or application of radium by fenestration of the larynx with a larger window than originally devised by Finzi and Harmer is superior to mere surgical operations like laryngo-fissure, hemilaryngectomy and total laryngectomy in this field of cancer treatment

DR V M KAIKINI

In all about eight cases of carcinoma larynx were operated on by me, and complete laryngectomy was done. Three of these were cases of intrinsic carcinoma which had gone beyond the early stage and involved the extra-laryngeal tissues. The other cases

were advanced extrinsic varieties of laryngeal cancer. Out of these, five died in about seven to nine days after the operation. Three cases recovered from the effects of the operation. Out of these two died of recurrence within about six months after the operation. One patient was alive eight years after the operation. After that he could not be traced as he went to his native place.

The first case was operated on in February 1931, and it was an advanced one, the lesion involving the larynx, epiglottis, pharynx, and the base of the tongue. It was practically an inoperable case but was tackled as that was the first case of laryngeal carcinoma that consented to get operated. The operation was done in two stages according to the method described by Gordon New.

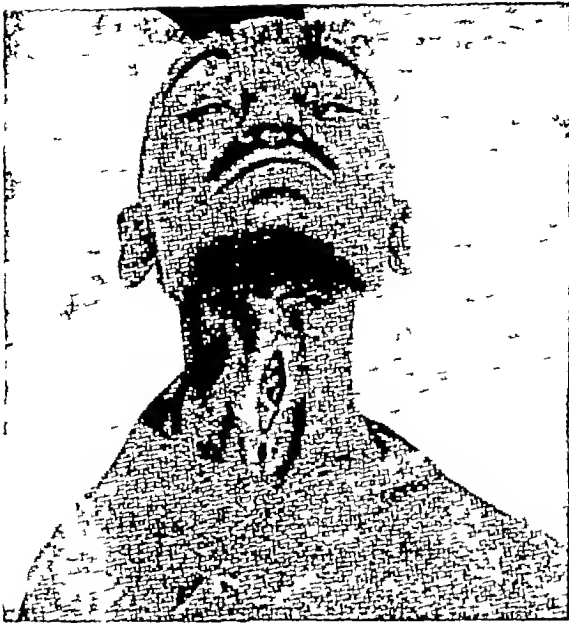
In the first stage the hyoid bone was divided in the middle line, the isthmus of thyroid was divided and the trachea was skeletonised by retracting the pretracheal muscles on either side, and tracheotomy was done. After about nine days the larynx was removed completely. There was very little shock. On the ninth day the patient went to the bath room without anybody's help. A stomach tube had been inserted through the mouth for feeding the patient. The wound had become very foul. On the tenth day the patient pulled out the stomach tube and got severe haemorrhage of which he died. Both the stages were done under local anaesthesia. In the second stage anaesthesia was induced according to Braun's method by infiltrating the cervical plexus with novocain at the level of the sixth cervical vertebra, by retracting the belly of the sternomastoid muscle outward.

The second case operated on in December 1931, was also an advanced one and the lesion was involving both the vocal cords, the anterior commissure and the pyriform fossa. In this case complete laryngectomy was done in one stage. The wound sloughed and a pharyngostome resulted. To do away with the stomach tube the patient was fed through a gastrostomy opening. After the wound became clean the pharyngostome was closed by a tube graft. The patient improved rapidly and was last seen in 1939 free from recurrence, and keeping well except for an attack of chronic bronchitis. He went to his native place after that.

The third case was operated on in December 1932. The carcinoma involved the larynx and the left pyriform fossa. Laryngectomy was done in one stage under local anaesthesia. Preoperative gastrostomy had been done to feed the patient. His wound healed by first intention and he was discharged in good condition. But he came about six months later with a small carcinomatous nodule in the thyroid region. He died of this after some months. Perhaps this was due to recurrence occurring in one of the thyroid lymphatic glands which, according to St. Clair Thomson, should be removed at the time of laryngectomy.

The fourth case was also an extremely advanced one. The patient, a student, was admitted for a carcinomatous growth of the pharynx involving the left lateral, the anterior and the posterior walls, and extending from the upper level of the pyriform fossa to well below the level of the cricoid cartilage. A preliminary gastrostomy was done. The operation was done under local anaesthesia by blocking the cervical plexus with novocain. The larynx was easily freed from the right side, but on the left side the tissues were found to be very adherent to the larynx due to malignant infiltration and involvement of the left wall of the thyroid cartilage, by the pharyngeal growth. The larynx was completely removed, but a large portion of the anterior and lateral walls of the pharynx had to be removed along with it. The growth was found to be more extensive than it was thought to be at first, and the major portion of the cervical oesophagus had to be removed as well. The patient was fed through a stomach tube inserted in the stump of the oesophagus left behind. The patient improved considerably in health and

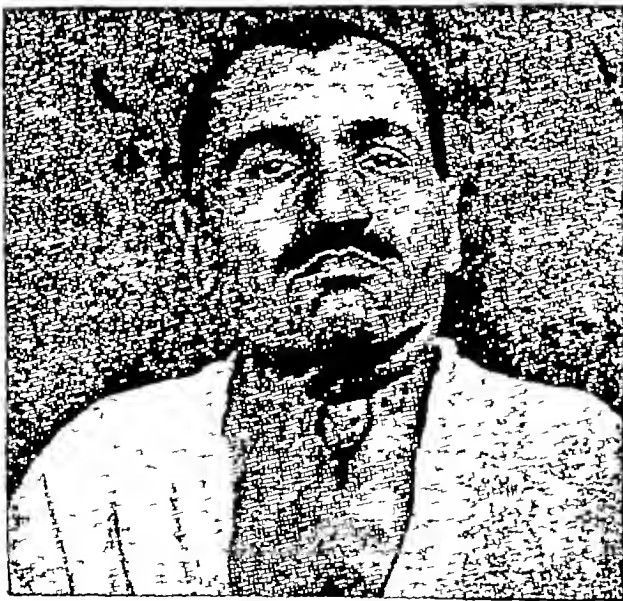
**Carcinoma of the Larynx**  
(DR V M. KAIKINI)



**Fig 1** Case 2 Patient about four weeks after operation  
A fairly big pharyngostome seen in the  
middle line of the neck



**Fig 2** Case 2 About two months after  
operation Tubal graft seen in the lower  
portion of the neck



**Fig 3** Case 2 About three months after operation  
Tubal graft seen at the upper portion of the neck  
which finally closed the pharyngostome



**Fig 4** Case 2 Patient four years after operation of  
laryngectomy with the pharyngostome completely  
closed and much improved in health

*By Courtesy of The Antiseptic*



was free from any trouble for about four months after the operation. Then he got a recurrence in the stump of the cervical oesophagus left behind, and died soon after by refusing to be fed through the gastrostomy opening which had been made to feed him. In this case deep X-ray treatment ought to have been tried for the growth in the oesophagus, but unfortunately it was not tried.

The fifth case was also an extremely advanced one, being a carcinoma of the cervical oesophagus at the upper end invading the larynx and forming a fistulous communication with it. On opening up the part, the growth which had started in the oesophagus was found to have extended from the level of the cricoid cartilage, below into the two rings of the trachea and above into the larynx. On the right side the prevertebral muscles were also invaded. The whole of the larynx and the cervical portion of the oesophagus and the trachea about 2" below the cricoid were removed. The operation was done under local anaesthesia and shock was very little. The patient died on the 7th day of mediastinitis. It was a very advanced case and practically inoperable.

Not being a specialist in ear, nose and throat work, my experience in the field of carcinoma of the larynx is very limited. What I found in my short experience is that complete laryngectomy in early cases of carcinoma larynx gives very good results especially when the lesion is intrinsic. Even when the carcinoma is beginning to be extrinsic good results might be expected in some lucky cases as happened in one of my cases quoted above.

Laryngeal carcinoma, especially intrinsic, is detected rather late as pain is a very late symptom, the early symptom being a change in the voice. Operation under local anaesthesia (blocking the cervical plexus) gives very little shock to the patient. The majority of the cases of carcinoma of the larynx gave a history of an attack of syphilis.

I have little experience of radio-therapy in this disease but the few cases that I have seen treated by X-ray had not been much benefited by this treatment. But I have been told by other surgeons who have had experience in this method of treatment that in some cases of early laryngeal carcinoma very good results have been obtained by radiotherapy.

Dr R. V. Rao and Dr M. Hussain also took part in the discussion.

#### DR GANDHI'S REPLY

In replying, Dr Gandhi remarked that biopsy is absolutely essential in each case for very good reasons. (1) To avoid the pitfalls in clinical diagnosis, even with very wide clinical experience. Biopsy is a documentary evidence of your conclusions and when a patient is about to undergo such a mutilating operation as laryngectomy, you cannot allow him to run that risk till by all evidence possible you have convinced yourself that your diagnosis is right. This biopsy can be done with accuracy and preferably from different points in the same growth as the degree of malignancy may differ at different points in the same growth at the same time. (2) To grade the degree of malignancy. We are better able to gauge the prognosis and, what is more, plan the treatment, i.e., grades III and IV are much more rapidly growing and surgery here is much more frequently followed by recurrence. As these are radio-sensitive, radiation therapy is the method of choice.

After paying a short tribute to the specialised work done at the Tata Memorial Hospital, Bombay, Dr Gandhi remarked that owing to its reputation, much earlier cases of cancer larynx went to them. When the Tata's speak about cancer cases which are operable,—and that class is not to be compared with ours—they generally have cases

which though extrinsic, are within the cavity of the larynx, where no part of the pharynx is involved and which are to be operated by "narrow-field laryngectomy." Whereas of our cases, all but one were going beyond the larynx into the pharynx—laryngo-pharyngeal—and could be removed only by including large segments of pharyngeal wall—all but one of our cases required "wide-field laryngectomy." These are the cases which, according to many American and European standards, are considered inoperable and are passed on for palliative deep-ray therapy. The results we have obtained by "wide-field laryngectomy" are in no way disheartening. It greatly increased our operative mortality but still the cancer-cure result is encouraging.

At the Tata's, by doing preliminary tracheotomy, 2 days before laryngectomy, a two-stage operation is done. We prefer to do a one-stage operation as the dissection along the tissue planes is much easier. The underlying idea of a two-stage operation is to safeguard against sepsis, (1) by sealing up tissue planes and (2) by acclimatizing the air passages and maintaining a free airway at the time of the operation. We have followed both methods and have found the incidence of respiratory complications about the same in both methods. Provision of free drainage and preventing aspiration in the trachea by constant suction allows us to do the one-stage operation with the advantage of easy mobilization. We have to do a two-stage operation when a preliminary tracheotomy becomes essential because of dyspnoea.

As to the provision of drainage—in wide-field operation where there is likely to be more tension on the line of suture and leakage, providing of free drainage is essential. But even in narrow-field laryngectomy, considering that even a reinforced suture line, without any tension, can give way and lead to gross infection of tissue-planes, provision of drainage is desirable.

Dr Rai's plea for allowing radiation therapy its proper place in the treatment of cancer is quite right. There are cases where radiation supplements the operation, in other cases it complements the operation, and there are still other cases where radiation is the method of choice and operation is contra-indicated (grades III and IV). Radiation treatment, we do know, is still in its infancy and is likely to grow so much that it might displace surgical treatment, but in the case of intrinsic cancer larynx where cure has been claimed in as much as 80% of cases—irrespective of grading—surgical interference is the method of choice. Deep-ray therapy has no place in the treatment of intrinsic cancer larynx. In extrinsic cancer larynx, grades I and II, whether operable with narrow or wide-field technic, operation followed by radiation in the nodal area and in extrinsic cases of grades III and IV, radiation therapy alone is the treatment.

As to the question of leaving dead space between outer and inner perichondrium after excision of the thyroidal in laryngo-fissure operation raised by Dr Venkat Rao, there remains no dead space as the inner perichondrium along with growth and underlying tissues is raised in one piece and excised and the outer perichondrium alone forms the walls of the cavity.

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# A CASE OF AUTO-ENTERECTOMY IN A CASE OF STRANGULATED HERNIA WITH AN ATTEMPT AT NATURAL END TO END FUSION

BY

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Various types of strangulated hernia have been met with but no case of natural attempt at auto-enterectomy with end to end fusion has been described. Over 150 strangulated hernias have been operated on by the author and this is the first example of this sort.

A Hindu male, aged 40 years, was admitted for a lump in the inguino-scrotal region with a bloated abdomen and with a history of a duration of one month.

He was married, had three children, all healthy. The first attack was noticed four years before admission. The onset of the attack was associated with swelling in the groin, remarkable pain and vomiting. After vomiting the swelling disappeared. Four similar attacks occurred later with similar results. The present attack started one month before admission with pain, swelling and vomiting. This time the swelling did not disappear with the vomiting. Vomiting occurred four or five times a day. He was treated by a local doctor who gave him liquid paraffin and fluid diet with no relief of the symptoms. He sought admission because of his persistent pain, swelling and vomiting.

On admission, he was found to be moderately nourished, anaemic, not jaundiced, tongue coated and slightly moist, teeth clean with no pyorrhoea. The testicle was in the normal position with good testicular sensation and was hypersensitive. Result of the enema after admission was satisfactory. Motion which was microscoped showed no evidence of dysentery or presence of any ova of intestinal parasites. Urine was normal but contained phosphates.

A chronic strangulated hernia was diagnosed and he was immediately operated upon under local anaesthesia. A transverse incision was used. The sac was found to be thick and oedematous and adherent round the remarkably constricted neck. In the sac there was dark stained fluid and, after suction, a small loop of small intestine was found hanging loosely from the neck of the sac as if by a cord having probably been naturally separated from the proximal and distal portion of the intestines at the seat of the constriction by pressure necrosis. The neck was mobilised with difficulty and,

during mobilisation, the wall of the sac was found to be adherent to the anterior and posterior aspects of the loop of bowel which looked almost continuous. The ends of the bowel having become approximated to each other were held firmly at the constriction of the neck by the adhesions that were formed in front, behind and below the wall by the peritoneal part of the sac above the constriction. This acted like a water-tight seal by holding together the separated ends and thus simulated a continuous loop of bowel. The omentum by its adhesions above served to complete the water-tight seal. After mobilisation the bowel was resected with the loosely hanging loop and a modified Bassini's operation was done and the wound was sutured in layers, draining the scrotum. The patient made an uneventful recovery and has replied to letters stating that he is in perfect health and has no recurrence of the hernia.

### Summary

1 This case is reported to show the natural attempt at auto-enterectomy and end to end fusion.

2 The duration of the symptoms extending over a month without serious deterioration of general health can only be explained in this case of strangulated hernia by the pathological appearances observed and is a very rare occurrence.

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**Auto-enterectomy in a case of Strangulated Hernia**  
(CAPT. M. G. KINY)



Illustrates the loop of bowel which was excised.  
Note the small loop which is hanging free  
from the apparently fused ends of the  
bowel above. The proximal part  
of the bowel shows a little  
hypertrophy and dilation

# Haemorrhagic Cyst of the Spleen (LT COL D R BHARUCHA)

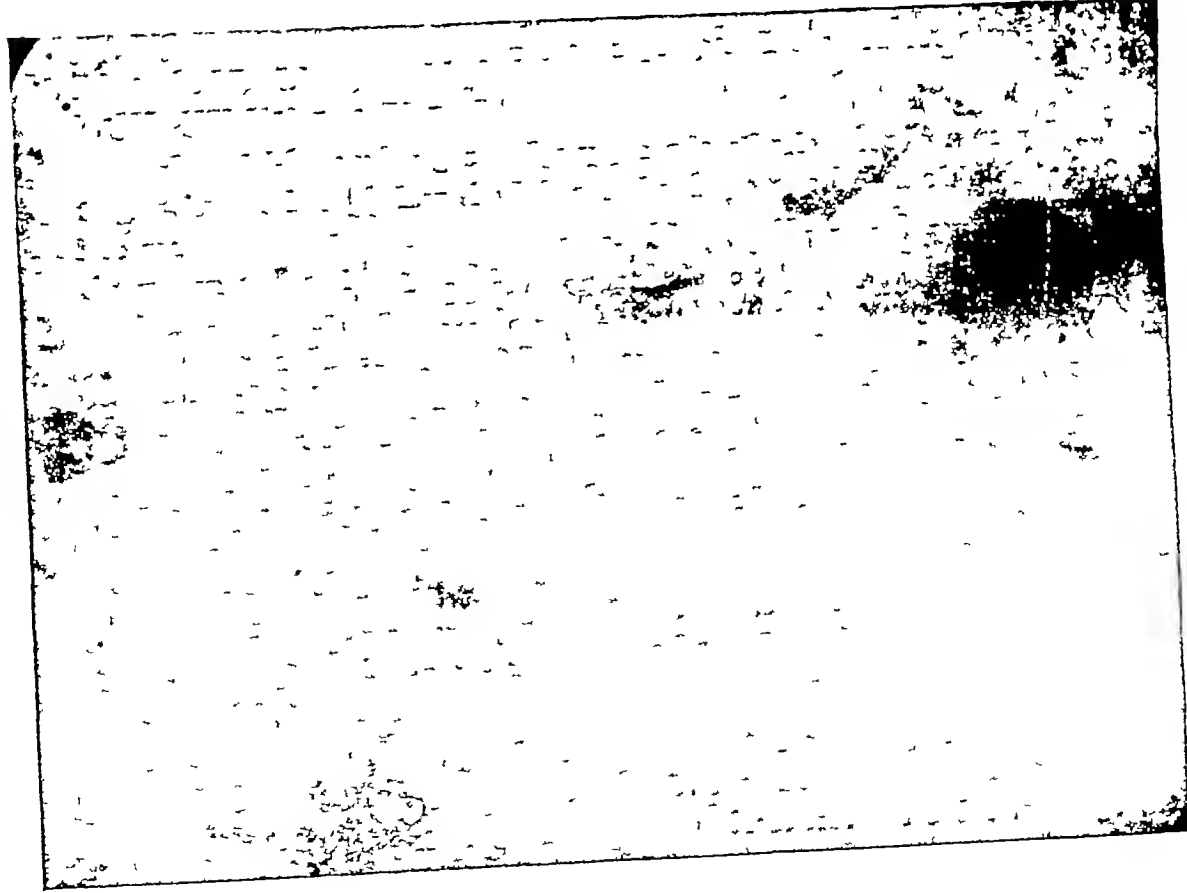


Fig 1 X-ray after injection of air into the splenic cyst. Note the fluid-level. The lower margin of the spleen is not clearly visible.



Fig 2 X-ray after injection of liquid BIPP into the splenic cyst. The cavity of the cyst is greatly diminished in size. The white arrows indicate the margin of the spleen and the black arrows show the outline of the left kidney.

# A CASE OF HAEMORRHAGIC CYST OF THE SPLEEN

BY

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Cysts of the spleen are very rare. R H Fowler writing in the International Abstracts of Surgery 1940, on cysts of the spleen, has collected about a hundred and forty cases reported during the last hundred years

Cysts of the spleen may be congenital, traumatic, inflammatory, neoplastic or parasitic. The commonest of all these is the parasitic due to the *ecchinococcus*. The contents of the cyst may be serum, lymph, blood, parasitic fluid or degenerative, neoplastic or inflammatory tissue.

These cysts are sometimes preceded by antecedent diseases like malaria, typhoid, paratyphoid, mumps or syphilis. Of these malaria is the commonest.

A haemorrhagic splenic cyst may be caused by trauma, infarction, thrombosis of the splenic artery, arterial degeneration, secondary haemorrhage in a serous or lymph-cyst or neoplasm of the spleen.

Usually there are no symptoms unless some complication sets in. In some cases pressure of a large cyst may cause digestive disturbances like constipation. Diarrhoea is present in a few cases. Intense peritoneal reaction may give rise to severe pain and vomiting and friction sounds due to perisplenitis. Ascites is present in some cases. A plain X-ray picture may help in arriving at a correct diagnosis. The lower left ribs are spread out, the left side of the diaphragm is raised, the shadow of the left psoas muscle is obliterated and the left kidney is displaced downwards. An X-ray of the stomach after a barium meal may reveal an indentation due to pressure and the descending colon, as visualised after a barium enema, may be displaced downwards. Of the signs and symptoms and X-ray appearances described above all are not present in every case.

*Case Report*—K N, a young man of twenty-nine years, was admitted to the medical wards of this hospital on 14-9-'42, complaining of fever with rigors and headache. His spleen at the time of admission was found to be three inches below the left costal margin. A blood film revealed BT rings and the patient was given the usual course of quinine, atabrin and plasmoquin. He became afebrile and the blood films were free of malarial infection.

About a week after the fever subsided he began complaining of pain in the splenic area which gradually increased and became so severe that morphia had to be injected to give the patient relief. The spleen was enlarged almost up to the level of the umbilicus and the abdomen was held rigid all over, particularly so on the left side. The patient could hardly bear the touch of the hand. On auscultation over the lower half of the left side of the chest and the splenic enlargement, a very marked and rough friction sound could be heard. There was no fever, and no malarial parasites were seen on repeated blood film examinations. The W B C count was 9,500 with 70% polymorphs. X-ray of the chest showed that the left dome of the diaphragm was raised and not moving well with respiration. For the next two weeks the splenic swelling continued to increase gradually in size and there was little relief from pain.

I again examined him on 2-11-'43 and found that the swelling was distinctly soft and fluctuating and dull on percussion. The patient was transferred to the surgical wards under me and on 3-11-'43 under local anaesthesia I aspirated seven ounces of sanguineous fluid. On culturing the fluid a pure growth of *B coli* was obtained. In order to visualise the size of the cavity I injected 60 c c of air into it through the aspirating needle and X-rayed him again. The accompanying picture (Fig 1) gives an idea of the size. Next day his condition became worse, his temperature rose to 103°F and he had a rigor. The swelling also increased rapidly and the W B C count rose to 14,000 with 80% polymorphs.

On 6-11-'43 under gas and oxygen anaesthesia I made a muscle-splitting incision a little below the left costal margin opposite the tip of the 10th left costal cartilage. The peritoneum was adherent to the outer surface of the spleen and a test puncture was made with an aspirating syringe and needle. Sanguineous fluid like that previously obtained was found. A small incision was made through the peritoneum and the outer wall of the cyst and over a pint of fluid escaped. There was no pus. After emptying the cyst, splenic pulp could be both seen and felt at the bottom of it and some of it was removed by a scoop for examination. A large rubber drainage tube was inserted in the cavity and the wound closed in layers.

The pathologist's report on the tissue removed was, "A large part of the specimen was composed of blood clot. The rest was a mixture of lymphoid tissue with polymorphonuclear cells. No definite Malpugian bodies were seen."

The patient made good progress and the swelling decreased in size rapidly at first and the tube was removed after three weeks. Later the opening contracted and discharge from the cyst lessened. In order to judge the

size of the cavity still remaining I injected liquid BIPP and re-X-rayed him on 29-11-'43 The accompanying X-ray (Fig 2) shows that it had, compared to the original size, been much reduced In order to facilitate better drainage I enlarged the opening slightly and put in a small rubber tube for two weeks more By the time he was discharged from the hospital there was hardly any cavity left

I wish to thank Lt-Col E P N M Early, I A M C , O C , I G H , for permission to publish these notes and Major Lucas, R A M C , for the culture and pathological reports.

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# A CASE OF CHOLEDOCHUS CYST (CONGENITAL CYSTIC DILATATION OF THE COMMON BILE DUCT)

BY

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A , 8 years, Hindu male child, was admitted to the medical side of the Children's Ward with the following complaints —

(1) Pain in the right upper half of the abdomen—duration 13 days

(2) Constipation—duration 4 days

Past history and family history did not reveal anything of significance

*Present illness*—The patient was in perfect health till 13 days ago, when he developed the pain in the abdomen which was continuous, and of a dull aching character and was fairly severe. The pain had no relation with food and was not accompanied by vomiting. He was febrile.

*On examination*—The patient was a thin-built boy. He had no pallor or jaundice. Spleen was palpable and the liver was enlarged 2" below the costal margin and was tender. Clinical examination did not reveal any abnormality in the other systems.

*Laboratory investigations*—*Stool* Reaction alkaline. Large number of discrete red blood cells, pus cells, degenerated epithelial cells, flakes of mucus and macrophages were detected. *Blood* Total leucocytes 14,600 per c mm. Differential count polymorphs 78%, lymphocytes 22%.

*Progress of the case*—Although no microscopical evidence of intestinal amoebiasis was found, still the presence of an enlarged, tender liver with pyrexia and leucocytosis was suggestive of amoebic hepatitis. An X-ray screen examination was done but the right half of the diaphragm showed normal position and movement. In spite of this a course of injections of emetine hydrochloride was given as a therapeutic test, but it had no effect at all. In the meantime the character of the pain changed from the continuous dull ache to colicky bouts coming on at intervals of about two hours. During the colicky attacks the patient became extremely restless and was crying in the

agony of pain and he used to get a profuse perspiration. It lasted for about 15 to 30 minutes and then subsided. Injection of atropine 1/200 gr was given for three days with no relief of the pain. Now the patient developed fairly intense jaundice, and palpation of the abdomen revealed a firm globular swelling in the right hypochondriac region moving with respiration. The case was transferred to the surgical side for exploratory laparotomy.

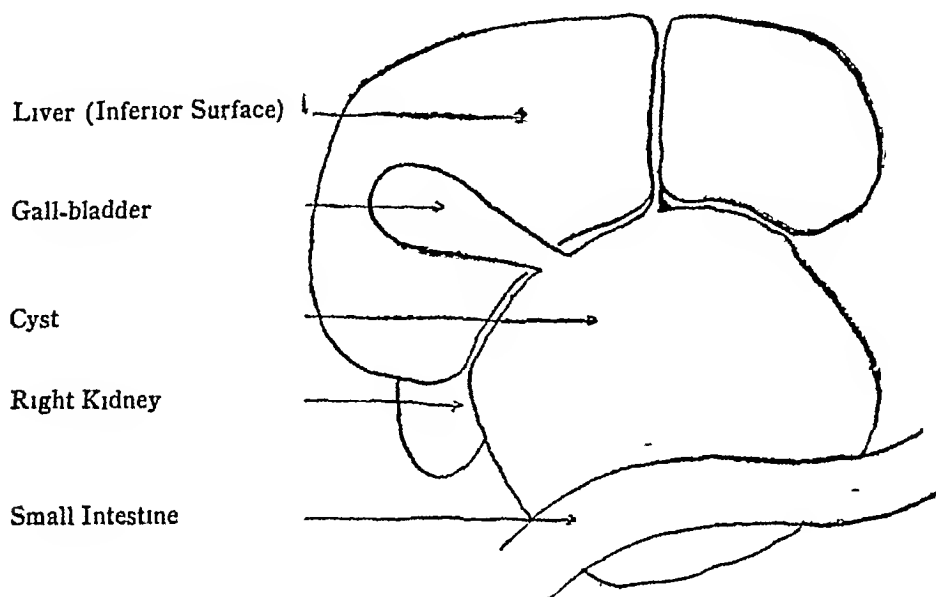


Fig A

*Operation*—Under chloroform anaesthesia the abdomen was opened by an upper right paramedian incision. The liver was enlarged. The gall-bladder was full and pushed up. There was a cystic swelling in the subhepatic space with the omentum and a few coils of the intestine adherent to its surface. The relations are shown in the sketch appended hereto (Fig A). A small portion of the surface was cleared of the adherent omentum and the cyst aspirated with a fine needle and 10 c.c. syringe. Thick bile containing mucus was drawn out. The opening was enlarged and the cyst aspirated with an electric aspirator. One pint of bile with thick mucus was drawn out. The condition of the patient being very low at this stage, the cyst was marsupialised and the abdomen closed.

Subsequent to the operation the patient was given intravenous infusions of glucose saline and vitamin K intramuscularly. He died after 21 days during which period he became progressively asthenic and emaciated. The relatives did not allow a post-mortem examination.

### DISCUSSION

The diagnosis of this globular cystic swelling in the subhepatic space lies between—

- (1) Pancreatic cyst

- (2) Cysts or swellings in connection with the biliary passages which could be
  - (a) dilatation of the biliary passages due to congenital atresia of the common bile duct, impaction of a stone in the terminal portion of the common bile duct or any other extrinsic or intrinsic pressure
  - (b) Choledochus cyst or congenital cystic dilatation of the common bile duct

A wider differential diagnosis need not be attempted in view of the characteristics of the swelling brought out at operation which easily rule out the other possibilities, e g, echinococcus cyst, retroperitoneal sarcoma, cyst of the kidney, hypernephroma, etc Taking the above one by one—

(1) Pancreatic cyst can be excluded by the nature of the content which was mucoid bile Pancreatic cysts do not contain bile and are more to the left side in position Further the continued drainage of bile from the cyst upto 15 days after operation rules out the possibility of its being pancreatic

(2) About the cysts or swellings in connection with the extra-hepatic biliary passages enumerated above, it is important to consider that the enlargement of the biliary passages due to extrinsic or intrinsic pressure involves the passages above the obstruction in general, including the gall bladder, and there is a uniform enlargement of all parts, whereas in congenital cystic dilatation the cyst is spherical and eccentric and other parts of the biliary system are not necessarily enlarged This has been clearly brought out by Shallow, Eger and Wagner The same workers have described that the condition of congenital atresia of the common bile duct occurs only in infants, jaundice is progressive from birth and death occurs within four to six months They have further mentioned that gall-stones are uncommon in childhood In the case under discussion there was slight enlargement of the gall bladder but the size of the cystic collection was out of all proportion to this enlargement Thus excluding the other possibilities and considering the nature of the swelling, the only plausible diagnosis is that of choledochus cyst It was unfortunate that due to the very low condition of the patient it was not possible to demonstrate more precisely the relations of the swelling A possible method of demonstrating exactly the connections of such a swelling can be the injection of sodium iodide solution into the cyst and tracing its course upwards and downwards

The interest of the case lies in its rarity, and the relatively few reports in the literature warrant the accumulation of all the available data in order to arrive at a thorough understanding of the subject The first case can be

traced down to Vater as far back as 1723 Todd, in 1918, brought out another report describing the remarkable enlargement of the biliary duct observed by him Judd and Greene described only one case encountered out of 17,681 operations on the biliary tract in the Mayo Clinic over a period of twenty years This was followed by another report by Masson and Riennets about a second case three years later McWhorter, in 1924, described a case and cited 47 in the literature Gross reviewed the literature in 1933 and described 52 cases in children Zinninger and Cash, in 1932, reported a case and were able to find reports of 82 cases in the literature Clark's extensive review during the same period is noteworthy Subsequent reviews on this subject have been made by Yotuyanagi in 1936, Walton in 1939, Poate and Wade in 1941, and Bangert in 1941 The most recent review is that by Shallow, Eger, and Wagner in March 1943 They have reported a case and reviewed 175 cases from the literature

The condition has been described to affect girls mostly and predominates in young ages Shallow and co-workers have given the percentage in females as 77% The case reported was a boy

In most of the reported cases the characteristic symptoms described have been colicky pain, intermittent bouts of fever and jaundice, and a cystic swelling in the right hypochondrium In the case under discussion the colicky pain and the jaundice came on in the latter part of the illness, two or three days before the operation, but the fever came on and persisted since the beginning of the illness The cystic swelling too was palpable in the latter part and could not be detected during the examination conducted on admission

The diagnosis could not be arrived at before the operation and it is interesting to note in that connection that according to Zinninger and Cash only three correct pre-operative diagnoses have been recorded Shallow, Eger and Wagner have recorded 15 correct pre-operative diagnoses in their series of 175 cases It comes to 8.6% The diagnoses most commonly made were echinococcus cyst, cholecystitis, pancreatic cyst or tumour, retroperitoneal cyst or sarcoma, hydrops of gall bladder, cysts of liver or obstructive jaundice Among other miscellaneous incorrect diagnoses were congestion of the liver, cirrhosis of the liver, tumour liver, cancer liver, biliary obstruction, malignancy of gall bladder, gastric carcinoma, intestinal occlusion, intussusception, mesenteric cyst, cyst of the kidney, hypernephroma, hydronephrosis, ovarian cyst, ruptured viscus, perforated ulcer, abdominal neoplasm, and congenital heart disease The methods advocated for aiding the diagnosis are

#### (1) Roentgenological studies—

- (a) plain film of the abdomen usually showing a faint shadow of the cyst,

- (b) gastro-intestinal studies with barium by mouth and enema, aiding in outlining the positions of the neighbouring parts of the gastro-intestinal tract which are displaced by the swelling,
- (c) descending pyelography may show a tendency to retention of the contrast medium in the upper part of the ureter (Shallow 1943) or a slight degree of hydronephrosis in the right kidney with the dilatation of the ureter down to the maximum diameter of the cyst

(2) Peritoneoscopy —This might be an aid in expert hands. It was used by Shallow and his co-workers in the diagnosis of their case.

Regarding the etiology of the condition a completely satisfactory explanation of all reported cases does not appear to be available at present but Yotuyanagi's hypothesis seems to offer a satisfactory solution. According to him the condition is congenital and probably depends on inequalities in the rate of epithelial proliferation during the stage of the occlusion of the primitive choledochus. Physiological changes in the sphincter of Oddi cannot be entirely excluded since such a condition in association with congenitally weakened duct walls could conceivably result in considerable dilatation. Congenital malformation, abnormal or angular insertion of the duct into the duodenum with kinking and obstruction of the duct, a valve-like arrangement of the intra-duodenal segment of the common duct, trauma, and aberrant pancreatic adenomas causing obstruction are some of the other ideas concerning etiology, but these are only of historic interest.

The treatment of the condition is operative. The operations practised for this condition have been (1) Direct external drainage, (2) Marsupialisation, (3) Extirpation of the cyst, and (4) Anastomosis of the biliary tract with the duodenum—choledochoduodenostomy, hepaticoduodenostomy or anastomosis of the cyst with the duodenum—with or without extirpation of the cyst. The most satisfactory procedures are the anastomotic operations. Extirpation should only be attempted when the patient is a good operative risk. Zininger and Cash have recorded a mortality of 29% with these operations. Shallow, Eger and Wagner in their case performed an extirpation of the cyst with hepaticoduodenostomy over no. 18 catheters (rubber) one in each hepatic duct, and kept these rubber catheters in place for six weeks after operation after which they removed these through a gastroscope. A review of the miscellaneous procedures used in treatment reveals a mortality of 83%. Primary anastomosis of the biliary system with the gastro-intestinal tract remains the treatment of choice. In the present case such an operation could not be undertaken because of the extremely low condition of the patient.

Our best thanks are due to Major General H C Buckley, M D , F R C S , I M S , Principal, Medical College, Agra, for the permission to publish the report of this case. It is a pleasure to acknowledge our thanks to Dr. P N Laha, M D , Lecturer in Diseases of Children, Medical College, Agra, who handed over the case to us for operative treatment.

## ABSTRACTS

*Recurrent Dislocations of the Shoulder Joint by Major Frederic W Ilfield and Lt-Col Hall G Holder (From the Journal of Bone and Joint Surgery, July 1943.)*

The authors after discussing the various methods of operations for recurrent dislocations of the shoulder, state—

That occasionally the labrum glenoidale may be so badly injured so as to make adequate repair difficult and the only resistance that might be offered to prevent a recurrence would be capsular resistance, with no adequate block to the sliding of the defective and flattened postero-lateral humeral head gliding anteriorly over the rim of the glenoid. In view of this consideration, the authors feel that for the successful prevention of recurrent dislocation of the shoulder, transplantation of the biceps tendon alone as described by Nicola is not sufficient. So they have devised a new technique of operation using a hockeystick incision with the curve starting over the lateral part of the coracoid and extending obliquely downward for a distance of three to four inches. The deltoid is dissected from the cephalic vein and pectoralis major and is retracted laterally, after its upper fibres have been cut from their attachment to the clavicle for a distance of about one and a half inches. This procedure gives a good exposure of the humeral head and enables the palpation of the posterior portion of the head of the humerus. The long head of the biceps tendon is transplanted through the head of the humerus in the manner described by Nicola.

After this, with an osteotome, the coracoid process together with its muscle is freed and retracted downwards. With a blunt instrument the anterior capsule of the shoulder joint with the subscapularis is defined by blunt dissection and between two silk suture ligatures the subscapularis is divided. In this manner, the neck and rim of the glenoid are exposed. A curved incision is then made below the rim of the glenoid on the antero-inferior aspect and a bone flap is elevated with the osteotome. Through a small incision the iliac crest is exposed anteriorly and a bone graft about three quarters of an inch by two and a half inches is obtained with half the thickness of the iliac crest. The graft is inserted under the bone flap in the neck of the glenoid at the level of the articular surface or slightly projecting about three-sixteenths to one quarter of an inch beyond the rim of the glenoid. It is possible to secure the graft as a wedge and is better strengthened with sutures. Closure is obtained by approximating the cut ends of the subscapularis. The tip of the coracoid with its muscle attachment is replaced and is secured with two silk sutures passing through drill holes at the base of the coracoid. The cut fibres of the deltoid are sutured back into the clavicle. After approximating the deltoid and the pectoralis major, the subcutaneous tissue and skin are closed with interrupted sutures. The arm is immobilised in a Valpeau bandage for from six to seven weeks at the end of which period active movements are begun.

The authors have given detailed notes with followup results of four cases. Though the shelf operation has been done before, they state a combination of shelf and Nicola has not been described in the literature. This procedure appears to be mechanically and physiologically sound.

M G K.

*Anaesthetic Procedures in Thoracic Surgery by S C Wiggan and P E Schultz (American Journal of Surgery, Vol LIV, No 1, p 5, October 1941)*

These authors with their experience of over 2,000 thoracic operations, recommend that pre-operatively, in addition to the estimation of vital capacity, etc., postural drainage must be carried out to diminish excessive secretions, on the morning of the operation. If the patient is known to have a large amount of secretion and is unable to evacuate it himself, bronchoscopy is preferred pre-operatively.

*Preliminary Medication* —(a) When cyclopropane with oxygen is used solely or in combination with regional novocaine anaesthesia, the patient is given nembutal gr 3, 2 hours before and morphia gr 1/6, atropine gr 1/150, one hour before operation. In the extremely ill patient, morphia is eliminated and nembutal reduced to a minimum.

(b) When regional anaesthesia alone is used, nembutal gr 1½ to gr 3, p.o., is given 2 hours before and then morphine sulphate gr 1/6 to gr ¼ with scopolamine gr 1/150, one hour prior to operation. Upon arrival at the operating room, if the patient is drowsy or quiet, the paravertebral injection is made. If this injection disturbs the patient too much, intravenous morphia gr 1/6 is given. This dose is dissolved in 2 c.c. of saline and given slowly, allowing 2 minutes for the injection.

*Technique of Administration of Anaesthesia* —I For thoracoplasty —(a) In cases with (i) excessive secretion, (ii) contralateral pneumothorax or thoracoplasty, (iii) history of recent haemorrhage, (iv) acute disease and (v) extreme debilitation, paravertebral block with 1% novocaine (containing 2 drops of adrenalin to each 100 c.c.) plus infiltration in line of incision, fascial layers and directly around the intercostals as they are exposed, is carried out.

(b) For patients in a better physical state than in the above group, induction with cyclopropane-oxygen is followed by infiltration with novocaine as above. The adrenalin is omitted in the presence of cyclopropane because of its sensitizing effect on the conduction mechanism of the heart.

II For pneumonectomy or lobectomy —The patient is first intubated. (a) In cases with little or no secretion, e.g., tumour lung, the endotracheal tube is passed after a preliminary induction with cyclopropane-oxygen. (b) In cases with excessive secretion or with cavities in the lung, the intubation is done entirely under local surface anaesthesia. After intubation, induction with cyclopropane is carried out. When respirations are under control, the patient is turned into the proper position and infiltration with novocaine carried out.

The concentration of cyclopropane is increased just before the pleura is opened, to forestall the effects of pleural reflex, and gentle positive pressure is applied soon after the pleura is opened. Positive pressure is again applied just before closure of the thoracic cavity, as this facilitates expansion of the lung.

After the operation, perform bronchoscopy and aspirate all secretions.

III For extra-pleural pneumothorax, the induction is first carried out with concentration of the gas varying between 15% and 25%. Injection of procaine 1½% paravertebrally and in the line of incision is then carried out.

IV For lung abscess, intubate the patient under local anaesthesia and then carry out the paravertebral injection of novocaine. Cyclopropane is not given, but the endotracheal tube is used for applying positive pressure with 100% oxygen, when the pleura is to be opened, to keep the lung against the chest wall, to dam back the pus and to bring about forced oxygenation for the patient.

V For empyema.—In recent cases, requiring simple drainage, local anaesthesia is the simplest and the most satisfactory.

In chronic cases, requiring the resection of several ribs and thickened pleura, cyclopropane better serves the purpose.

VI For cardiac cases, a good control of respiration, facilitating cardiac surgery is obtained by endotracheal cyclopropane and oxygen combined with regional novocaine anaesthesia.

VII For transpleural approach for diaphragmatic hernia, tumours of the lower end of the oesophagus or fundus of the stomach, the following procedure is carried out — (1) Pre-medication, (2) Levine tube through the nose for gastric drainage in gastric cases, (3) Intubation under topical cocaine or larocaine, (4) Regional infiltration and paravertebral novocaine block, (5) Induction with cyclopropane-oxygen and (6) Injection of the phrenic nerve with novocaine  $\frac{1}{2}\%$  when the thorax is opened.

When only one thoracic cavity is opened, there is no real need for positive pressure until the surgeon wishes to reinflate the lung just before closing the thoracic cavity. But if both thoracic cavities are opened intentionally or accidentally, positive pressure becomes a vital necessity. Post-operatively by continuous administration of oxygen till blood-pressure, pulse, etc., are stabilized, by suitable anti-shock measures, by proper position of the patient in bed and by the use of non-depressing sedatives like "Pantopon" and "Dilaudid", the post-operative morbidity and mortality is very greatly diminished.

U. M. R.

Primary Carcinoma of the Duodenum by L. Berger, M.D. and H. Koppelman, M.D. (*Annals of Surgery*, Vol. 116, No. 5, November 1942.)

In presenting a proved case of primary carcinoma of the infra papillary portion of the duodenum, these authors have reviewed the literature of all types of primary duodenal carcinoma covering a total of 386 cases and having an incidence of 0.3% of all intestinal carcinomata. Of these 386 cases, 19.9% were supra-papillary, 65% were peri-papillary and 15% were infra-papillary. The sixth decade was the commonest age and M:F varied as 2:1 to 4:1.

Supra-papillary cases (77 cases).—The chief symptomatology was that of duodenal obstruction, the other symptoms in order of frequency being vomiting, epigastric pain, weakness, loss of weight, jaundice and dyspepsia. About  $\frac{1}{4}$  of the cases had a palpable mass in the region of the tumour. Roentgenological studies were chiefly valuable in ruling out lesions of the stomach, colon and gall-bladder, though the picture of an ulcer or an obstructive lesion in the duodenum was present in some cases. Pathological picture was most often that of a cylindrical cell carcinoma. The incidence of metastases was low. The results of treatment were very discouraging. The operation of choice was resection of the whole duodenal segment with gastro-enterostomy, if the bile and pancreatic ducts were not compromised.

Peri-papillary cases (250 cases).—The relatively early development of obstructive jaundice (acute in 80%) was the cardinal symptom in this group and was present in

99% of recorded cases Jaundice was accompanied by fever in 33% of cases The principal accompanying symptoms were pain (60%), loss of weight and strength, anorexia, vomiting, constipation and diarrhoea in that order Very few had any palpable mass, while 78% had enlarged livers and 1 the cases had palpable gall-bladders Correct pre-operative diagnosis was made in 20% of cases and was suspected roentgenologically in 25% Carcinomata of this region were usually of the soft, bulky, polypoid variety with an early tendency to ulceration and bleeding, which accounted for the fact that about 20% exhibited blood in the stools—a guide to early diagnosis

In 122 cases, some *operative result* was known. Of these, 64 had purely palliative procedures for the relief of obstructive jaundice, with an operative mortality of 73.5%, while in 58 cases, radical resection of the primary tumour had been attempted alone or in combination with other procedures, with an operative mortality of 29.3%. Of those that survived the operation, 8 cases (13.8%) were known to be living and well for *two years or more* after operation, while four of these (6.8%) were alive and well *five years or more*

In the exceptional case of a very small tumour, simple excision may be radical enough to get wide of the growth, in others, the two stage procedure of Whipple (1938) appeared to be the operation of choice for the future In the *first stage* of this operation the common bile duct is ligated, the jejunum is sectioned and a cholecysto-jejunostomy and entero-anastomosis are performed according to the Y-principle of Roux At the *second stage*, gastro-enterostomy is performed and is followed by a block resection, including the descending portion of the duodenum, with the distal portion of the common-duct and a V-shaped section of the head of the pancreas The open duodenal ends are closed and the pancreatic ducts are ligated tightly Orr in 1941, reported that this operation had a 33% mortality and a 26.6% survival till then

*Infra-papillary cases (58 cases)*—The principal symptoms were pain, vomiting and cachexia, while anorexia, constipation, diarrhoea and jaundice were found less commonly Only 16.6% had a palpable mass in the region of the tumour Roentgenologically there was an obstructive lesion of the duodenum in 40% of cases The usual gross pathological picture is of a broad, flat ulcerating mass Eleven radical resections have been tried in this group Of the 9 known results, there was a mortality of 33% Of the remaining 6, three were alive at 3 months and 3 at 15, 16 and 20 months respectively after operation Of the 22 cases, in whom palliative or exploratory procedures were carried out, there was an immediate mortality of 90% and all were dead in three months The operation of choice is resection of the affected segment and re-establishment of the alimentary continuity by duodeno-jejunostomy Handfield Jones brought the jejunum to the right under the superior mesenteric artery, until it lay in position for anastomosis to the proximal duodenal segment, without tension Lahey's plan of ante-colic duodeno-jejunostomy may also be applied to these lesions

The authors predict that the future prospects of radical surgery in duodenal carcinoma look brighter since a rational surgical technique is available for each group of cases and since metastasis at the time of exploration is low

U M R

# Association Notes

## GOVERNING BODY

R N COOPER (Bombay)	— <i>President</i>	
K. G PANDALAI (Madras)		} <i>Past Presidents</i> ( <i>Ex-officio Members</i> ).
S R MOOLGAVKAR (Bombay)		
L M. BANERJI (Calcutta)		
N C JOSHIE (New Delhi)		
H HYDERALI KHAN (Hyderabad)	— <i>Vice-President</i>	
C P V MENON (Madras)	— <i>Secretary</i>	
M G KINI (Madras)	— <i>Treasurer</i>	

## MEMBERS

- 1 S R JOGLEKAR—Bombay
- 2 V R MIRAJKAR—Lahore
- 3 A V BALIGA—Bombay
- 4 P CHATTERJEE—Calcutta
- 5 M M CRUICKSHANK—Bangalore
- 6 K S NIGAM—Lucknow
- 7 S SUBBA RAO—Bangalore
- 8 N MANGESH RAO—Madras

## The Annual Conference

The Annual Conference was held last year at Hyderabad from the 28th to the 31st December. There was a large attendance, and the arrangements made by the Reception Committee left nothing to be desired. Excellent accommodation was provided for the delegates in the Hostel attached to the new University buildings, and there were a number of social events characteristic of the great reputation Hyderabad holds for its hospitality.

On the 27th evening, the Governing Body met at the Osmania Hospital and scrutinised the ballot papers in addition to going through the routine business of the Association.

The formal opening of the Conference was held in the Town Hall, Jubilee Gardens.

Nawab Khusru Jung Bahadur, Minister for Public Health and Chairman of the Reception Committee, opened the proceedings with a message from H E H The Nizam —

I deem it a privilege first to read out to you the very gracious message which His Exalted Highness has been pleased to command me to convey to the Delegates and Members of the Association of Surgeons of India. The message reads —

*"I have much pleasure in extending to the members and delegates of the Fifth Annual Conference of the Association of Surgeons of India a hearty welcome to the Capital of my Dominions. The profession to which you belong is indeed a noble one and exacts from all those who follow it a large measure of disinterested service. Conditions in the world of today, more particularly during these days of war, afford you all the greater opportunities for such service. Those in the profession in India have responded magnificently to the needs of the hour but even a greater response is required. I have little doubt that you and others engaged in your noble profession will rise equal to the occasion."*

*"May your deliberations and exchange of ideas here lead you to even greater successes than what you have already achieved in the domain of amelioration of human suffering and curing of disease. The results of your labours and their practical application will be watched by me with profound interest."*

*I trust you will take back with you the happiest recollections of your visit to this city."*

#### RECEPTION ADDRESS

Welcoming the delegates and members the Nawab said —

Mr President, Delegates and Members of the Association of Surgeons of India, Ladies and Gentlemen

I would like to add to H E H the Nizam's message the welcome which I am desirous to extend to you on behalf of His Exalted Highness's Government as well, on your visit to this historic Capital City of His Exalted Highness's Dominions

As the seat of Government of the premier Indian State, and on account of its traditions, Hyderabad occupies in many ways a unique position. By the synthesis of the many cultures which have found a single home in this State and which have been worked into a harmonious whole, Hyderabad possesses peculiarities which you may not find in other parts of India. As a State too, we stand for progress. The State has indeed, during the period of His Exalted Highness's rule, made great strides in every direction and been the pioneer of many progressive movements. The Osmania University is one of those, through it, for the first time in educational history in India, an Indian language has been made the medium of University education.

Our Medical College is an institution over a century old and has had, since the inauguration of the Osmania University, the same Indian language as its medium of instruction. Suitable medical and scientific terms have been coined and standard works on every aspect of medicine and surgery have since been translated. You may also be interested to know that, over half a century ago, the well known Hyderabad Chloroform Commission made valuable contributions to the science of Anaesthesia, and, at the invitation of this Government, eminent scientists from Edinburgh and London were represented on that Commission.

As a layman I feel naturally diffident in making observations on the field covered by your profession. I may, however, draw your attention to the great contributions made to surgical theory and practice by India in her early days and by Arabia. It is in the

fitness of things, therefore, that you who inherit the traditions of that past and have also benefited from the advances made since then in the science and art of surgery by experience and research and the consequent growth of knowledge, should be anxious periodically to meet and to exchange notes and ideas. Much has been done and much still remains to be done. Many difficult problems still await solution and even investigation. Yours is not a profession which, as in the case of certain other sciences, is utilized for the ends of destruction. Your object and the aim of your researches is to alleviate suffering and to cure disease—a very noble task indeed, and at no time so valued or valuable as today when the world is moving under the dark shadow of a war waged not merely on the battlefield but bringing death, mutilation and suffering to millions in cities and towns and villages. Your profession has responded nobly to the increasing calls on its services during these days and, I am sure, the response will continue to be as generous and spontaneous in the days to come.

Again, gentlemen, I welcome you all heartily

#### PRESIDENT'S SPEECH

Dr N C Joshie, the President, then delivered his Presidential address

Hon'ble Major-General Nawab Khusru Jung Bahadur, Members and Delegates of the Association of Surgeons of India, and Ladies and Gentlemen

I am deeply conscious of the privilege you have accorded to me to-day by asking me to preside over this 5th Annual Conference which is being held under the distinguished patronage of His Exalted Highness the Nizam of Hyderabad and Berar. Of all the honours which may come to a man, I believe, the appreciation of his colleagues and fellow workers should be the most prized of them all, and in spite of the consciousness of my own deficiencies I feel proud of the privilege, and I am grateful to you all for this opportunity to serve you and the Association and hope and pray that I may prove worthy of your confidence. It is our oriental custom to bow to the chair before taking it to show respect to those who have previously occupied it, therefore in reverence to the tradition I offer my greetings to the past presidents of our Association.

It is a pleasurable thought for me that I am presiding over a session which is meeting in Indian India for the first time, and that too, in this picturesque and historic city of Hyderabad, the capital city of the biggest and most progressive State in our country. As we look at the domes and spires which adorn this ancient city we cannot help feeling that here is the glory which has not slumbered, and that generations have fruitfully toiled to build for the future. Your university to which you look with pride is an inspiration to one and all and the attempt of your medical faculty to impart modern medical knowledge in the language of the people will be followed by us with keen interest. I congratulate you in your ruler who has the vision to project and lead and has the generosity to endow your institutions so munificently. You have spoken, Sir, of Deccan culture and we can understand and appreciate your legitimate pride in what you have achieved. We are all looking forward to the day, which in future of time must come, and let us hope, sooner than later, when we shall have a great national culture, a real fusion of the diverse elements in our civilisation. Long ago I took to heart as my motto that life well lived was an attempt to leave your little corner of the earth a little better than what you found it and I am intrigued to see that those who have had handling of the affairs of this State held a similar attitude.

We met last at Calcutta under the distinguished leadership of our colleague Dr L. M. Banerji, we did not think at that time that conditions in our country would so

deteriorate as to make us postpone our next meeting. After the lapse of one year we decided that we should not let another year go by. Everybody was anxious that the good work should continue and the torch should be kept alight. We meet again in the shadow of a Great War and armageddon has come nearer home to us. Some of our cities have already seen a few achievements of modern science dealing out death and destruction,—an end exactly opposed to our own utilisation of Science for the salvaging of human life. As far as we are concerned as a profession, we may be sure of a huge legacy in the crippled and the maimed who will need all our skill and all our energies, and I am sure, true to our vocation, they shall receive of our best in full measure. In his own inimitable way, Bernard Shaw once said that the world was quite willing to scrap its old machine guns and its old armaments but was not prepared for what was essentially needed to-day to scrap its old values and to have a revaluation of values. Who will say that the man who is hurling a deadly missile from the skies is not achieving that end.

More than 2,500 years ago this tired planet of ours gave birth to the mighty figure of a Buddha who preached his gospel of peace and charity and love towards all creation, and whole continents, who heard the message, forgot the memories of blood and iron days and throbbed with a new life and a new hopefulness for the future. Inspired by that teaching, our own country saw an Emperor on the throne who broke his blood-stained sword on the field of battle and registered a solemn oath to never again wade through blood towards an empire. This great Emperor—Asoka the Great—in the words of H. G. Wells, is the only name that shines like a star amongst all the names which crowd the columns of history, built what is supposed to have been the first organised hospital at Sarnath and other places and brought the comfort of the art of healing to both man and beast. There is cause for us to feel depressed in that an oriental people, professing to have accepted the teachings of Buddha should have perpetuated a Pearl Harbour. We have had our surfeit of Savagery in the days of our Chengis Khans and Tamerlanes and Nadir Shahs who deluged whole continents in blood through long interminable years. One would have thought that we, on this side of the globe, had learnt our bitter lessons through these centuries of travail, and had come to realise the futility of it all. Surely the world needs another Buddha who will reevaluate our values. It is comforting, however, to feel that the beginning of the end is in sight and let us all hope that it will not be the end of the beginning, as a war-weary world found to its regret after 1918.

Turning now to the affairs of the Association, I am pleased to tell you that it has grown in strength and usefulness. Born out of the fertile brain of Col. K. G. Pandarai of Madras it is just 5 years old. The foster parents have done their duty well and ably, and the infant baby promises to be healthy. The avowed purpose of our annual gatherings is the reading and discussing of scientific papers on pre-arranged subjects. This I call conscious effort. The other side, whereby you imbibe ideas without conscious effort, is not less important nor less instructive. Informal talks and discussions, which are inevitable in the social intercourse of men engaged in the same field of work, are of immense educative value. I know of no other way of usefully spending a few days of leisure than in the company of a friendly colleague. There are different ways of meeting surgical situations which confront us so often and frequently baffle us, and there is no better way to take the conceit out of you than to see the work of a colleague. We medical men are charged by lay people as most given to "talking shop." When you stop to think that it was not so much long ago that we were barbers, it is not difficult to understand the genesis of our weakness. In my part of the country, many members of our ancestral fraternity still flourish as a challenge to their successors. Coming to the point, you will all agree with me that the benefits of social contacts between professional men, gathering at one place from different parts of the country, are not to be ignored. There is such

a thing as geographical distribution of disease, and this gives rise naturally to a geographical development of skill in different directions. The scientific papers are, of course, the essence of our meetings, and we gather to learn the experiences of our colleagues working in different parts of the country.

Young men in American Universities have a saying that the worst form of vice is advice, and if, in my making some suggestions, I appear to indulge in this form of vice, I must not be understood to be deliberate. I must stress the needs of our Journal. It demands our serious attention. I have seen some good articles by our members in other periodicals which, I feel, should have graced the pages of our Journal. I am not jealous, but charity should certainly begin at home when there is a family to bring up. With a large membership such as ours, there should not be a dearth of material for one Surgical Journal. On behalf of the Editorial Committee I must beg you all to give priority to your own Journal.

Two years ago I informally suggested our inviting some eminent member of the profession practising a speciality to read to us a paper on some aspect of his subject, and that we should extend our meetings by another day and devote it to his discourse. When I made this suggestion I had in mind the various threshold subjects which border on our work, and without a working knowledge of subjects like Physiotherapy, Radio-therapy, Biochemistry, etc., and also the various Neuroses which so frequently present diagnostic pitfalls and lead to unnecessary surgical interference, our work is incomplete. The lay public's idea of a Surgeon is a man who cuts the human body, and this, as we know, is far from being the whole make up of a surgeon. In fact, it takes a man much longer time to learn when not to cut. A surgeon lives in his head and not in his hands, and I recall in this connection, what W. J. Mayo once said, "God save us from the Bold Surgeon." Surgical skill, coupled to a ripe surgical judgement, and guided by a tuned surgical conscience—these are the factors which go in the making of a surgeon, in the making of a man in whose hands a steel blade is a weapon of mercy. It is only by seeing things in perspective, as parts of a larger field, that we can develop the right attitude. I would make the microscopist peep through the telescope frequently. It was with this idea that I opposed the instruction in surgery on living animals. After all, you can only teach technique that way, and technique has never been difficult to teach. It comes easier to some than to others, but the development of surgical judgment—the essence of good surgery—comes only through years of apprenticeship. I am extremely glad to learn that my suggestion has been acceptable to you, and that the Association has this year invited Brigadier Grant Massie to speak to us and that he has been good enough to accede to our request. I do hope to see this innovation as a regular feature of our annual meetings.

Another suggestion which I made, and which, I feel, we should follow up in right earnest, is that for a central library. Individual libraries there are, and will continue to exist as long as there are book lovers, but they do not meet the needs of an Association. There is no satisfactory medical library in the whole country to which earnest students could refer. I cannot keep recalling to memory the U. S. Surgeon General's Library at Washington D. C., there, carefully classified and catalogued, is a wonderful collection of medical literature in books, periodicals, and manuscripts, and all is available to accredited students. I desire to keep this Association and this platform completely free from politics, even medical politics. I am aware that politics has the disconcerting habit of running after you, even though you run away from it, and I do hope that I shall not be accused of treading on the toes of politics when I suggest that we make an attempt to have the present library attached to the Surgeon General's office at Delhi which at present is a mere apology for one, converted into a real institution worthy of the name. Failing this, we might seriously consider having one of our own. It will certainly not

be an easy task but it will give this Association a life and stability which nothing else will give

Another point which I desire to stress is the development of the surgical specialities. Although Gynecology as a speciality is now fairly well started in our country, the other subjects like Orthopaedics, Plastic Surgery, and Neuro-surgery, cry for recognition. Surely the time has now come for these to come into their own and receive undivided effort and attention. Those, who like me, have to plough their lonely furrow, know our limitations only too well but we look up to our big teaching institutions with their adequate staffs and adequate material to undertake this work. I can here only draw the attention of our members, who are represented on the staffs of these institutions, to do what they can. We have skilful men in these various branches of work amongst us, but what I am pleading for is the development of teams of workers, for it is only thus that we can hope for continuity of effort and future progress. The important thing for us to learn is to solve our own problems, and this demands organisation and disciplined co-ordinated action. *There is a great wealth of clinical material in our country, and, if we are only true to ourselves and our vocation, a wonderful future certainly lies before us.* Such teams of workers are in time bound to develop into post-graduate Training Centres.

You, Mr Chairman, have drawn attention in your address to the achievements of the orient in the field of medicine in bygone days. There is certainly much in our past in which we can take legitimate pride. The history of oriental medicine has been very inadequately studied, and this is a subject which some one of our members might profitably undertake. It could be taken as a hobby or side line, and should prove a most fascinating and interesting subject. Prof Osler is said to have frequently insisted on his pupils the importance of a study of the history of medicine in order to rise above mediocrity and to attain maturity of mind. The history of a single instrument is interesting enough and what can be done in this direction, can be gathered from a work on the history of the development of the obstetrical forceps by one of our countrymen.

We hold an exhibition of surgical instruments and appliances every year in connection with our meetings. This is as it should be, but we are not doing our duty by the exhibitors. We must take a greater interest in their exhibits. There is a natural relationship between our work and their craft and the bond should be firmly cemented. Before we criticise them too harshly we must remember that they are working under similar restraints and hardships as we are. The manufacture of a surgical instrument is a very highly specialised line of work and is the manufacturer's problem as well as the Surgeon's problem, and unless the two can get together, it will not be solved. We amputate a limb and feel that our duty to our patient is finished. I respectfully point out that unless we have rehabilitated him with an artificial limb, our duty to him is not finished. The amputation itself should have been performed with that object in view, and here, I submit, is an instance of the artisan and artist co-operating. With all the emphasis at my command I implore all organisers of our annual meetings to try to make these exhibitions more fruitful. Perhaps a Committee of the Association could be appointed to scrutinise the exhibits and mark good ones as "approved".

Some of our members have not been able to attend this year. Although we regret their absence, we are cheered by the thought that they are doing their duty at their posts, and this is after all, the chief reason of our existence. We send them all our greetings.

One member of our profession and of our teams who receives very little recognition from us, and who deserves our gratitude, is the nurse. She contributes so much to

the success of our work, and we unintentionally appropriate all the eulogy. On a formal occasion like this, and on a formal meeting of professional men, it is only proper for us to offer the nursing profession our regards and esteem.

I have said all that I had to say. It only remains for me to thank our hosts. Our grateful thanks are due to you, Mr. Chairman, for your generous references to our Association and for obliging us by coming here in person with the gracious message from His Exalted Highness. Your kindly words will certainly be an encouragement to us all. Your references to your beautiful city are well deserved, and we are sure to carry with us very pleasant memories of our stay here and of our generous hosts. I have travelled through a large part of the world and am known to be a bitter critic of my countrymen, but there is one aspect of life in which we perhaps excel all others, and that is our open handed hospitality to the stranger at our doors. We should have been here last year but we proved unfortunate guests. We must have caused you all some inconvenience and perhaps, annoyance. You have all been good enough to forget it and have kept your doors open to us for a whole year to enter when we please. You have indulged in a little flattery in your references to us, or, rather, should I say that we feel flattered by your words of welcome.

I must not forget to thank your local Secretary—Dr. Munawar Ali. I have once held this office myself and know what a hard task it is. He amply deserves our thanks, and I offer him my personal sympathy.

I should not forget to remember our General Secretary, Dr. C. P. V. Menon of Madras. Apart from being a skilful surgeon he has proved himself to be a skilful and energetic Secretary and he amply deserves our recognition.

In conclusion, I must express, on behalf of this Association of Surgeons of India, our profound gratitude to His Exalted Highness the Nizam of Hyderabad and Berar, under whose gracious patronage we are holding this fifth annual conference and may I ask you, Sir, to convey our respectful appreciation to His Exalted Highness.

Dr. Munawar Ali, the Local Secretary, proposed a vote of thanks to the Government of H. E. H. the Nizam, for receiving the Conference in Hyderabad and for its generous contribution to the funds of the Reception Committee, and to the Chairman of the Reception Committee.

After a group photograph of the members of the Association and the Reception Committee was taken, there was a largely attended luncheon, which included as guests many prominent men of Hyderabad and Brigadier Grant Massie, Chief Consulting Surgeon to the Army in India. This luncheon took the place of the customary Annual Dinner.

In the afternoon at the Osmania Medical College with Dr. N. C. Joshi in the Chair, the paper on Laryngeal Carcinoma by Drs. H. D. Gandhi and S. G. Joshi was taken up for discussion. Dr. Joshi presented the paper and a long and interesting discussion followed. (The paper and an abstract of the discussion appear elsewhere in this issue of the Journal).

In the evening the members were entertained to a sumptuous tea by the Vice-Chancellor, the Hon. Nawab Mehdi Yar Jung Bahadur, in the magni-

ificent hall of the new Arts College After tea, the members were taken round the Arts College and the whole scheme of the Osmania University was explained to them The meeting of the Editorial Board was also held in the Arts College Later, the members were the guests of the Chairman of the Reception Committee at an informal dinner

The following morning the members went round the Wards of the Osmania Hospital and witnessed some surgical work At 12 Noon, Brigadier Grant Massie delivered his lecture on "Recurrent Dislocation of the Shoulder" At the end of the lecture, Brigadier Massie answered a few questions

The Superintendent of the Hospital entertained the members at lunch in the Nurses' Quarters After lunch, the discussion on 'Injuries of the Thorax' was taken up Dr C S Patel opened the subject with a long and exhaustive paper and a discussion followed (abstracts of this paper and the discussion will appear in the next issue of the Journal)

The next morning was spent in visits to the Hyderabad Central Military Hospital and the Indian and British Military Hospitals A few members were received by Nawab Sir Salar Jung and had the privilege of seeing his valuable collection of jewels and art treasures

The annual General Body meeting was held at 12 Noon with the President Dr N C Joshie in the chair The Secretary read the Annual Report and it was passed The resolutions passed by the Governing Body regarding travelling allowance to the Secretary's clerk and remuneration to the Auditor were passed It was decided that the offer of a prize of Rs 150 for the best essay on "Infections of the foot" be renewed There was some discussion on the choice of contributors to the Text Book of Surgery proposed to be published Finally by a resolution proposed by Dr M R Cholkar, confidence in the Committee appointed by the Governing Body was re-affirmed and the Committee was requested to expedite the publication

It was also decided that the beginnings of a Central Reference Library should be made The Library was, for the present, to be located at the Head Office at Madras

The Governing Body had proposed, in order to avoid the necessity of dropping subjects on account of inability on the part of the Openers to be present, that each subject should be taken up by at least two members, one of whom will be called the Seconder and will open the discussion in the event of the Opener dropping out for any reason This proposition was agreed to and Seconders were selected for all the subjects to be discussed later The full list of subjects with Openers and Seconders is given below

Proposed by Dr C P V Menon and seconded by Dr S R. Joglekar, Dr R N Cooper was unanimously elected the next President Dr Cooper expressed his thanks

The results of the election to the Governing Body was announced The following eleven members were declared duly elected.—

- 1 H Hyderali Khan, Hyderabad
- 2 C P V Menon, Madras
- 3 M G Kini, Madras
- 4 S R Joglekar, Bombay
- 5 V R Mirajkar, Lahore
- 6 A V Baliga, Bombay
- 7 P Chatterjee, Calcutta
- 8 M M Cruickshank, Bangalore
- 9 K S Nigam, Lucknow
- 10 S Subba Rao, Bangalore
- 11 N Mangesh Rao, Madras

The time and place of the next Annual Meeting was next discussed The sense of the meeting was that the Christmas holidays would be the best time and this was adopted The invitation from Lahore was accepted and Rai Bahadur Dr G D Kapur was elected Local Secretary

The President then moved a resolution of condolence on the untimely demise of the following members —

Drs V N Moorthy, R N Bhatia and G L Khirwadkar

He paid a short tribute to the work of each member and the resolution was passed unanimously, all the members standing

The President in concluding the session paid a tribute to the excellence of the discussion and the success of the session The Secretary then proposed a vote of thanks to the President He expressed on behalf of the Association his appreciation of the excellent and energetic work turned out by the Local Secretary, Dr Munawar Ali, and his willing staff of student volunteers

The newly elected Governing Body met immediately afterwards Dr H Hyderali Khan was elected Vice-President, Dr C P V Menon as General Secretary and Dr M G Kini as the Treasurer 10 more new members were admitted

The business part of the session being finished a day earlier than arranged, advantage was taken of this to visit the historic caves of Ajanta and Ellora. The party left by train the same evening to Aurangabad which we reached next morning. Excellent arrangements had been made for the excursion by the Civil Surgeon of Aurangabad and though the journey by bus for a distance of over 80 miles was trying what lay at the end of it made up for everything. The Director of Archeology of the H. E. H. the Nizam's Government took the party round and a few hours were spent amidst the marvellous specimens of ancient Indian Art, and it was with a feeling of great regret that one turned one's back on those wonderful paintings which would have taken days to study and appreciate properly. The return to Aurangabad was perhaps even more trying and it was near midnight when we got back to the Hostel where we were to spend the night.

The following day Ellora was on the programme, and on the way to the caves a halt was made to go round the Mausoleum of Rabia Daurani, the tomb of the wife of Aurangzeb and modelled after the Taj. Time was not available for visiting all the caves at Ellora, but a few of the more interesting ones were gone through. Getting back to Aurangabad in the afternoon, there remained one more, the last, of the functions the hospitality of Hyderabad had provided, and this was a tea at the Aurangabad Club. Some of us had to rush through this to catch our trains. A group photograph at the Club and then it was "Good-bye" to Hyderabad and a very successful session.

### The Library

The attention of all members is invited to the Circular regarding the Library. A separate account has been opened and donations and subscriptions may be sent to the Secretary. Suggestions regarding books and journals to be acquired are welcome. Donations will be acknowledged in the Journal from time to time.

### SUBJECTS FOR DISCUSSION

#### 6th Meeting

##### 1. *Surgery of the Gall-Bladder*—

Opener Dr P. Chatterjee, Calcutta

Seconder Dr H. Hyderali Khan, Hyderabad.

##### 2. *Carcinoma of the Breast*—

Opener Dr N. C. Joshi, New Delhi

Seconder A Surgeon from Tata Memorial Hospital, Bombay

##### 3. *Urinary Lithiasis*—

Opener Dr L. B. Joshi, Karachi.

Seconder Dr H. L. Vaidya, Kathiawar

## 7th Meeting

1 *Traumatic Surgery of the Skull—*

Opener Dr R N Cooper, Bombay

Seconder Dr G D Kapur, Lahore

2 *Enlarged Prostate—*

Opener Dr S R Moolgavkar, Bombay

Seconder Dr S S Anand, Lahore

3 *Fractures of the Neck of the Femur—*

Opener Dr B N Sinha, Lucknow

Seconder Dr A K. Talwalkar, Bombay

## 8th Meeting

1 *Carcinoma of the Rectum—*

Opener Dr C P V Menon, Madras

Seconder A Surgeon from Tata Memorial Hospital, Bombay

2 *Carcinoma of the Cheek—*

Opener Dr B M Joly, Delhi

Seconder Dr K. M Rai, Madras

3 *Hare Lip and Cleft Palate—*

Opener Dr S C Sinha, Calcutta

Seconder Dr M G Kini, Madras

## 9th Meeting

1 *Bone Tumours—*

Opener Dr D R Meher Homji, Bombay

Seconder A Surgeon from Tata Memorial Hospital, Bombay

2 *Intracranial Tumour—*

Opener Dr A. V Baliga, Bombay

Seconder Dr R. N Cooper, Bombay

3 *Burns—*

Opener Dr M R. Munawar Ali, Hyderabad

Seconder Dr G M Phadke, Bombay

## Prize Essay

The offer of a prize of Rs 150 for the best Essay on "Infections of the Foot" is renewed. The following are the conditions —

1 The competition is open to all qualified medical practitioners registered in India, who have been in practice for not more than 10 years after qualification

2 The essay should be based on original work and should be written in English,

3 It should be type-written on one side of the paper only and should not contain the name or other indication of the identity of the competitor. Four copies should be submitted.

4 The name, address and qualifications, however, should be written on a separate sheet of paper and enclosed with the essay.

5 The subject is "Infections of the Foot" and the essay should reach the Secretary before the 1st October 1945.

6 The copyright for the winning essay will remain with the Association of Surgeons of India and will be published in the Indian Journal of Surgery. Other essays will be returned to the senders, if accompanied by stamped addressed envelopes.

7 The Governing Body may, at its discretion, withhold the prize if the essays submitted do not come up to the standard.

8 All communications regarding the above are to be addressed to the Secretary, Association of Surgeons of India, 'Binfield,' Kilpauk, Madras.

C P V MENON,

*Hony Secretary*

# THE INDIAN JOURNAL OF SURGERY

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(Published by the Association of Surgeons of India)

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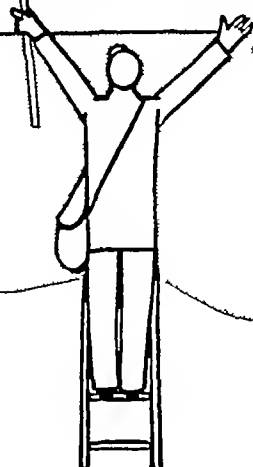
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छिद्यन्नासासम पत्र तत्तुल्यं च कपोलतः ॥ ५९ ॥  
त्वङ्मास नासिकासन्ने रक्षस्तत्तनुता नयेत् ।  
सीव्येद् गण्डं तत् सूच्या सेविन्या पिचुयुक्तया ॥ ६० ॥  
नासाच्छेदे च लिखिने परिवर्त्योपरि त्वचम् ।  
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शोणितस्थापनैश्चान्यैः सुश्लक्ष्णैरवचूर्णयेत् ।  
ततो मधुघृताभ्यक्तं बध्वाचारिकमादिशेत् ॥ ६३ ॥  
ज्ञात्वावस्थान्तरं कुर्यात्सद्योव्रणविधिं ततः ।  
छिद्याद्भूदेधिकं मासं नासोपान्ने च चर्म तत् ॥ ६४ ॥  
सीव्यं ततश्च सुश्लक्ष्णं हीनं सवर्धयेत् पुनः ।

ASHTANGA HRIDAYA UTHARA STHANA  
Chapter, XVIII

*In the adult the mutilated nose can be remade. The patient is prepared for the operation in the usual way. First a leaf (or any other suitable thing) is cut to the desired shape and size. A flap of the skin with subcutaneous tissue, similar to this, is dissected out from the cheek, near the nose. The nasal end is left intact and the flap made as thin as possible. The wound on the cheek is then sutured with a small piece of cloth spread over it. The flap is turned over and sutured. Carefully to the nasal defect the edges of which have been freshened, the*

*attachment of the flap to the cheek being carefully preserved To aid comfortable breathing, tubes are inserted into the nostrils, so as to keep them elevated from within Fresh oil is smeared over the part and the wound dusted with a fine powder containing several haemostatic agents A mixture of ghee and honey is also applied and the part bandaged The patient is placed under the usual post-operative treatment, or the treatment prescribed after accidents, as the condition may require When the wound is nicely healed, exuberant tissues, if any, are trimmed, the attachment (of the flap) near the nose is divided, (the wounds) sutured and defects, if any, made up*

---

# ROENTGEN OR X-RAY THERAPY OF INFLAMMATORY CONDITIONS

BY

K MANJUNATH RAI, M B, F R C S E, D M R (LOND),

CLINICAL PROFESSOR OF RADIOLOGY

AND

RADIOLOGIST, GENERAL HOSPITAL, MADRAS

The treatment of inflammatory conditions has been dealt with by different Radiologists in different ways. One school by direct radio-therapy, i.e., irradiating the site of infection, i.e., the focus, the other by indirect radio-therapy, i.e., irradiating the spleen or the epiphyses of long bones so as to obtain a generalised reaction of the system to influence the local condition. The experience gained through these years by Radiologists all over the world shows that though indirect Radio-therapy is of doubtful value, direct Radio-therapy of the focal spot is of undoubted value in the cure and amelioration of certain conditions.

After the first enthusiasm, when it was sought to apply Radio-therapy to the most varied diseases, the indications for this method are to-day circumscribed and the beneficial action of Radio-therapy seems henceforth indisputable in a certain number of inflammatory affections, especially the acute, the sub-acute and the localised. Similarly the experience gained during these years has established the technique to be followed in the Radio-therapy of these lesions and that is Radio-therapy applied directly to the inflammatory focus.

## Mode of Action

The mode of action of Radio-therapy in these conditions has been widely discussed. The changes—local and general, provoked by irradiation—be it direct or indirect—on the inflammatory focus constitute the key to the analysis of this irradiation.

## DIRECT RADIOTHERAPY

The modifications that take place under the influence of Direct Radio-therapy are both local and general. The study of these modifications is of fundamental importance and the data obtained therefrom can be used in the

understanding and the explaining of the mode of action of Radio-therapy. These modifications can be grouped as follows —

(1) *Clinical*—These are both subjective and objective Subjectively there is improvement in general condition and decrease of pain Objectively—there may occur a slight exacerbation of local signs during the first few hours following irradiation At the end of 24 to 48 hours there is diminution of the swelling, infiltration, redness, and of the lymphangitic phenomena if they exist The temperature curve is in accordance with the tendency either to the formation of a purulent collection or the progressive resorption of the exudates up to complete resolution of the condition

(2) *Local Modifications*—24 to 48 hours after irradiation we can prove the progressive disappearance of the germs in the irradiated focus, a large proportion of the organisms appear to be phagocytosed Further, if pus from an irradiated focus is inoculated into an animal, the organisms are seen to be less virulent

After a transitory period of hyperaemia and oedema which coincides with the local exacerbaton, the oedema diminishes in some parts the leucocytes show absorbed organisms, in other parts they appear fragmented

Naturally a complete histological study of these modifications in the inflammatory tissues following radio-therapy can only be conducted experimentally by provoking an abscess in an animal, as was done by Businco when he inoculated a guinea-pig with typhoid bacilli He observed the following facts, which agree quite closely with the work of the other authors

*Control abscess*  
*at the end of 24 hours*

Inflammatory phenomena extending almost to the subcutaneous tissue, purulent necrosis with amorphous substance and cells in fatty degeneration, small cell infiltration and fibroblastic proliferation tending to circumscribe them round these necrotic foci

*Irradiated abscess*  
*at the end of 24 hours*

The necrotic foci are less numerous and less extensive and abundant connective tissue fibres

*Control abscess*  
*at the end of 48 hours*

Extension of the inflammatory phenomena to the muscle plane, hyperaemia and small haemorrhages,

*Irradiated abscess*  
*after 48 hours*

The foci are circumscribed, small, celled infiltration with abundant fibroblastic trabeculae Connective

numerous foci among fibroblastic tracts, fatty cellular degeneration even in the muscle fibres

tissue proliferation extending well beyond the focus. The young connective tissue is rich in newly formed small blood vessels and in cells but here and there crossed by adult connective tissue, with fibrillar new-formation in the protoplasm of the fibroblasts and tracts of compact homogeneous bundles. The greatest part of the young connective tissue cells takes vital colours and represent a proliferation of the reticulo-histiocytic tissue.

*Control abscess  
after 96 hours*

The foci tend to break down, oedema and haemorrhages in the foci, poor fibroblastic reaction

*Irradiated abscess  
at the end of 96 hours.*

The central necrosis is limited by bundles of connective tissues, cells with all the characters of adult connective tissue are grouped around the focus, scarcity of blood vessels; reunion of the fibrils in compact bundles, the fixed cells presenting the character of cells in division (fibrocytes) with a nucleus rich in chromatin. Small celled infiltration and abundance of dividing cells extend well beyond the central focus.

*Control abscess  
at the end of 7 days*

Central necrosis with liquefaction, small celled infiltration, poor connective tissue reaction

*Irradiated abscess  
at the end of 7 days*

Central focus has almost disappeared, it is limited by abundant connective tissue, rich in cells a proportion of which has the characters of young cells and another that of adult cells. One can easily recognise the zone of young connective tissue, which has been transformed into adult tissue, by the form of cells and the density of the bundles of homogeneous-looking connective tissue.

(3) *Modifications in the Circulating Blood*—Leucopenia immediately or some hours after irradiation, then leucocytosis for the following hours increase in the proportion of polynuclears with tendency of the Aineeth Index to deviate still more towards the left (polynuclears with two nuclei), presence of some myelocytes, lymphopenia relative and sometimes absolute. The leucocytosis persists more or less for some time, but generally at the end of 24 to 48 hours the number of leucocytes tends to diminish.

But in the main, these modifications of the blood to which, formerly, one attributed an exaggerated role in the course of immunisation are modifications which are produced in all irradiations and their relation to immunity seems to-day quite relative.

(4) *Serological Modifications*—Some workers state that they have observed, following irradiation of an inflammatory focus, an increase of the phagocytic power, the opsonic index and the bacteriolytic power. But many other workers deny not only that leucocytes destroyed by irradiation can liberate antibodies but also deny the existence of all or part of these serological modifications.

In assessing the value of either tissue immunity or serological immunity or both, it has been acknowledged to-day that precedence should be largely given to cellular immunity.

### INDIRECT RADIOTHERAPY

With regard to indirect Radio-therapy, experience through all these years has shown that the beneficial value appears to be very meagre.

### Experimental Researches on the Modifications following Irradiation

A survey of the experimental researches on the changes following irradiation may be of some use as a complement to the study of the local and general changes just reviewed. All these experimental researches can be arranged in two large groups for the part which interests us —

- (a) research on the bactericidal action of radiations.
- (b) research on the production of antibodies under the influence of radiations.

(a) *Bactericidal action of Radiations*—With strong doses and soft rays it is possible to demonstrate experimentally a bactericidal action and a varying sensitivity of different bacteria, but it is a question of experimental researches with the aid of enormous doses.

In practice, with the doses commonly used in therapy, one can exclude a direct bactericidal action. However one cannot do less than consider the possibility of the changes being brought about by the supporting structure.

A series of experiments has brought forward the possibility of a direct bactericidal action due to beta rays and the secondary rays of fluorescence.

Experimentally the bactericidal action was demonstrated using various metals as secondary radiators. The bactericidal action which commences with iron and copper reaches an optimum with silver and heavy metals.

The above experiments were carried on by various workers on *B anthrax*, *B pyocyaneus*, *B typhosus*, *B paratyphosus*, *B coli*, staphylococci, etc.

In every case, allowing reservations for modifications of the soil, no direct bactericidal action of the irradiations is shown at least with the doses commonly used.

(b) *Production of Antibodies under the influence of Radiation*—Researches in vivo to establish the relation between radiation and the production of antibodies when animals and men are irradiated—normal animals or experimentally infected ones, normal men or carriers of inflammatory infections—allow us to draw the following conclusions —

(i) Irradiation given before infection generally provokes an inhibition of the antibody formation.

(ii) Irradiation exercises no action on antibodies already formed.

(iii) Irradiation given during immunisation can, according to some workers, only provoke a greater formation of antibodies and only when the doses administered are small. These workers do not agree about the kind of antibody which is formed in greater abundance.

### Conclusions

1 When we analyse the results obtained by radiotherapy in inflammatory affections, we agree that the best results are obtained in the large group of suppurative diseases, where the focus is irradiated directly.

2 Whereas the local modifications are easily ascertained, the production of antibodies by radio-therapy is disputed, and, at least in a number of cases, the presence of antibodies is a fact not directly the result of cause and effect—but a fact parallel to the amelioration of the disease. The raising of the immunity process seems disputed. On the other hand, the serological reactions are not always evolved parallel to the degree of acquired immunity. As for the changes in the blood, they are not a characteristic factor since they do exist in the course of all irradiations.

3 All the experimental investigations give disputable results and they cannot be directly applied to the human pathology, the only point of agreement is perhaps the injurious action of large doses. A direct bactericidal action is not demonstrable, at least with the doses commonly used in therapeutics, but it must not be forgotten that radio-therapy can act in an indirect way by modifying the supporting tissue.

The sensitisation by means of secondary metallic radiators offers many interesting points capable of clinical application.

All these investigations bear on the interpretation of the efficacy of radiotherapy in inflammatory affections, essentially as a local action, whereas the general immunisation changes, be it in the sense of a bactericidal action of the blood or in the sense of an increase of the agglutination power or the anti-toxic and bacteriolytic power of the blood, only seem to come into play as secondary factors.

Nevertheless, we do not wish to exclude the possible intervention of the immunity process, since in the struggle and defence of the organism against foreign agents, the serological defence is in a fair way giving place to the cellular defence. The last, accepted by Metchnikoff and his school, was elaborated by Aschoff who attaches it to the creation of the reticulo-endothelial system.

In the mechanism of the action of Roentgen rays, we must consider the final influence as the sum and combination of various factors which are called into action at each irradiation, the local action being the predominant one.

Four essential factors can figure in the discussion concerning the local action.

- (i) The action of the radiations on the local circulation
- (ii) The necrobiotic action on the cells of the infiltrated tissue
- (iii) The action of the radiations on phagocytosis
- (iv) The action of the radiations on the cutaneous reticulo-endothelial system.

These last two factors can also be grouped together by reason of the relationship existing between phagocytosis and the reticulo-endothelial system.

1 It is noted that, under the influence of radio-therapy, a hyperaemia is produced at the site of the irradiated focus, the capillary alterations always precede the microscopic alterations. The redness is the sign of vascular dilatation. The hyperaemia provokes changes in the superficial and deep circulation, it can have effect on the inflammatory oedema and in a certain sense can act in the same way as "stasis".

2 The local necrobiotic action (destruction of labile elements and action on the surrounding medium) causes destruction of local infiltrations and this diminishes the tension and swelling in the irradiated focus, with corresponding diminution of pain. The destruction of leucocytes carries with it a liberation of proteolytic ferments to which is perhaps due the purulent discharge.

The direct action can besides manifest itself electively on the most sensitive cells of the irradiated tissue or on the other hand it can predominate on the surrounding medium such as blood vessels and connective tissue as when repeated small doses of slightly penetrating and not very selective rays are employed.

3 The histological researches and experiments made with small and moderate doses are interesting. It has been shown that when weak doses were used no difference in the phagocytic activity of the reticulo-endothelial system was seen between the control animals and irradiated ones, whereas when moderate doses were used it was definitely shown that this phagocytic power was increased.

The number of cases treated in the Barnard Institute of Radiology, General Hospital, over a period of about four years, are herewith presented below

	Total
Unresolved Pneumonia and Post-pneumonic lung abscess	123
Whooping Cough	40
Joint diseases such as Post-operative inflammations, Synovitis and Arthritis	106
Fibrositis (Lumbago)	145
Inflammatory conditions of the lymphatic glands acute and chronic as Tubercular adenitis	354
Affections of the Nerves such as Sciatica, Trigeminal Neuralgia, Post-herpetic Neuralgia, etc	75
Bell's Palsy	14
Pharyngitis, Tonsillitis, Laryngitis	29
Abscess, Furuncle, Carbuncle, Whitlow, etc	54
Sinusitis	6
Parotitis—Infective, Post-operative and acute	17
Inflammation of bone	15
Calcification of Supra-spinatus Tendon and allied conditions	39
Bronchiectasis	3
	<hr/>
Total	1020
	<hr/>

Of these there were 8 cases of failures in the treatment of pneumonic consolidations and abscesses. Three of them subsequently turned out to be Tubercle, Actinomycosis and Bronchial Carcinoma. In the rest of the 5 cases, the causes of the failures were not traced.

An analysis of the above figures and Case Reports presented below clearly shows that the application of Roentgen rays in the treatment of inflammatory conditions has a very useful and definite place. A suitable dose of X-Rays given in time may save some lives and in certain types of cases will often make any other treatment unnecessary. But unfortunately this method of treatment is not considered or its possible efficacy not appreciated until every other method has been tried. It is only during the very early stage of acute inflammations that the maximum benefit from this treatment can be expected, but unfortunately sometimes cases come too late when the condition has progressed beyond hope of obtaining the best results. As more Surgeons and Physicians become acquainted with and convinced of the value of X-Ray therapy this situation will no doubt be improved.

One reason, and that is an important one, why many Physicians and Surgeons hesitate to try Roentgen therapy in acute inflammations is that they have in mind the systemic reaction which so frequently accompanies and follows the treatment of malignant tumours and the unfortunate changes in the skin which sometimes arises weeks, months or even years after such treatments. It is difficult to make them realise that the treatment of acute inflammations is different and that the range of doses used and the number of fields irradiated in most of the cases are so much smaller that the question of systemic reaction or of deleterious changes in the skin does not arise at all in practice.

Any one who thoroughly goes through the extensive literature bearing on the treatment of acute and chronic inflammations cannot but be impressed by its volume and by the large number of different conditions in which the method has been found to yield excellent results. Many of the reports are based on small groups of cases and in others the diagnosis does not appear to be well established. But even if all these are eliminated there still remains a considerable number of reports by experienced and careful workers which cannot be dismissed so lightly.

In our experience such acute inflammatory processes as furuncles, carbuncles, abscesses, erysipelas, parotitis, sinusitis, otitis media, pneumonia especially delayed resolution in lobar pneumonia, post-pneumonic lung abscess, Bell's palsy, acute fibrositis of the back (Lumbago), etc., treated early enough by a small dose of Roentgen rays respond, in a large proportion of cases, by a rapid diminution of pain and by resolution of the inflammation,

and in some of the above cases, without suppuration. When the affected area is exposed to a similar dose after suppuration has started, although pain is relieved more slowly, suppuration is accelerated. When the inflammatory lesion is treated after suppuration has reached an advanced stage, little or no change takes place in the course of the process.

As for chronic inflammations which are known to be benefitted by irradiation such as tuberculous adenitis and sinuses, peritonitis, synovitis, actinomycosis, sciatica, etc., the pathologic circumstances are different in that the leucocytic infiltration is less prominent but with the pronounced feature of proliferation of connective tissues. In comparison with the leucocytes, connective tissue cells have such a low grade of radio-sensitiveness that they must be classified as radio-resistant. This is what exactly is seen in practice. The earlier the chronic inflammations are treated, the better they respond to radiation. Further the treatment must be repeated and larger doses have to be given to obtain a cure or maximum benefit.

### Case Reports

#### LUNG ABSCESS

Mr C, aged 35 years, was admitted on 13-10-43 for lung abscess, right upper lobe of three weeks' duration. Patient was complaining of severe cough with profuse foul expectoration. The course of the disease was apyrexial with a W.B.C count of 20,000.

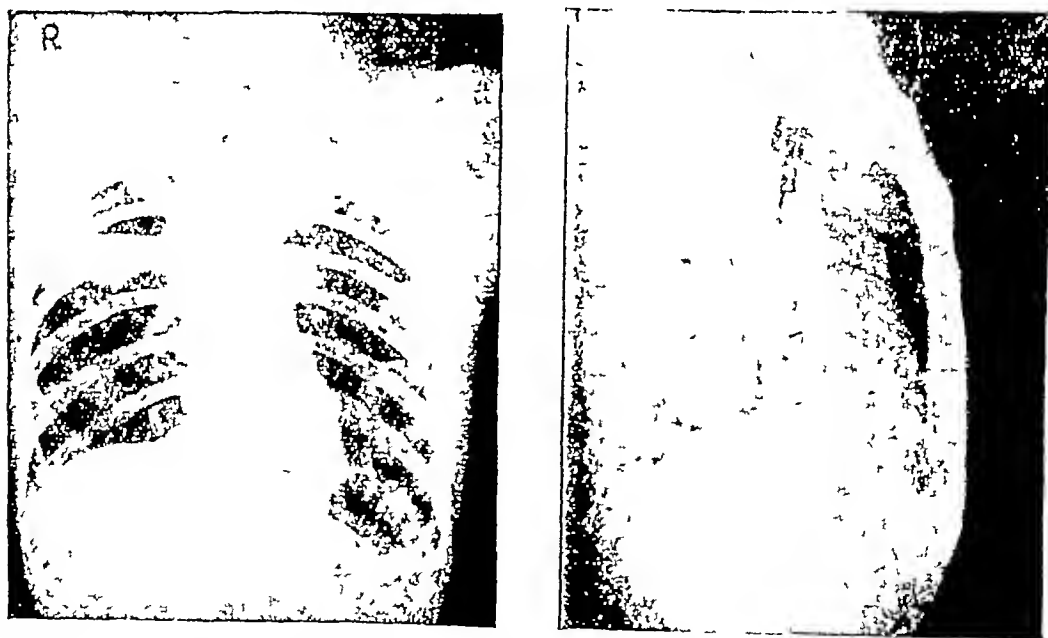


Fig 1 & 2 Skiagraphs taken before treatment. A P and lateral views show a large abscess cavity in the right upper zone.

per c.mm., with slight polymorpho-nuclear increase. After 3 treatments cough and expectoration improved considerably. The treatment was over on 4-11-43. A total skin

dose of 1,300 r was given to the lesion through two ports of entry. A complete resolution of the lesion resulted as shown by radiographic examination. Skiagrams taken before and after the treatment are shown in Figs 1, 2 and 3.

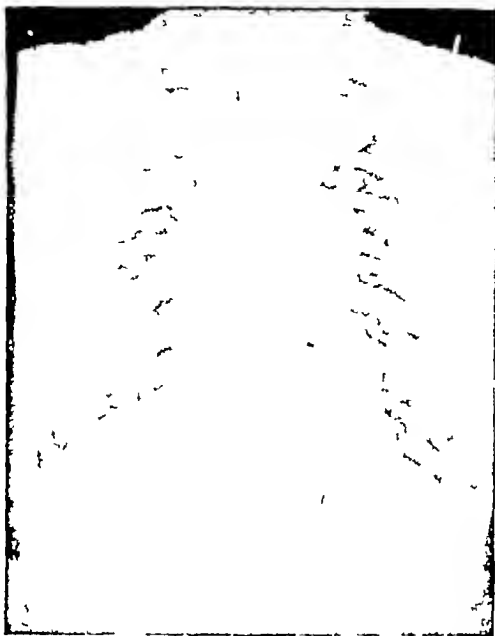


Fig 3 Skiagram taken soon after the completion of X Ray treatment shows complete resolution of the abscess

### WHOOPIING COUGH

E, aged 10 years, a case of whooping cough of 3 weeks' duration was admitted for X-Ray therapy on 9-9-43, medical treatment being of no avail in controlling the paroxysms. Deep X-Ray therapy was given to the mediastinal glands. In about 6 days there was marked decrease in the number of paroxysms and at the end of the course of treatment which extended over a period of ten days there was complete relief from paroxysms.

### OSTEO-ARTHRITIS

W, aged 51 years, case of Osteo-arthritis right knee was admitted for Deep X-Ray therapy on 20-8-43. A moderate dose of deep X-Rays combined with Ultra Short Wave therapy was given. The treatment consisted of 8 sittings over a period of nearly 3 weeks and at the end of this, pain was relieved to the extent of about 90%. A report from the patient six weeks later intimated complete relief of pain. The following Radiographs taken before treatment and nine months after the completion of the treatment show the improvement in the condition. (Figs 4 and 5)

### FIBROSITIS-LUMBAGO

H, a member of the I.M.S., came in with a complaint of pain over the left side of the small of the back, extending over a period of a few weeks. Radiographs of the lumbar spine and the Lumbo-sacral synchondrosis were normal. Since ordinary medical treatment failed to relieve pain, he was given Radio-therapy and the pain, relieved to a great extent within 10 days, completely disappeared at the end of 4 weeks.



Fig 4 Radiograph taken before treatment

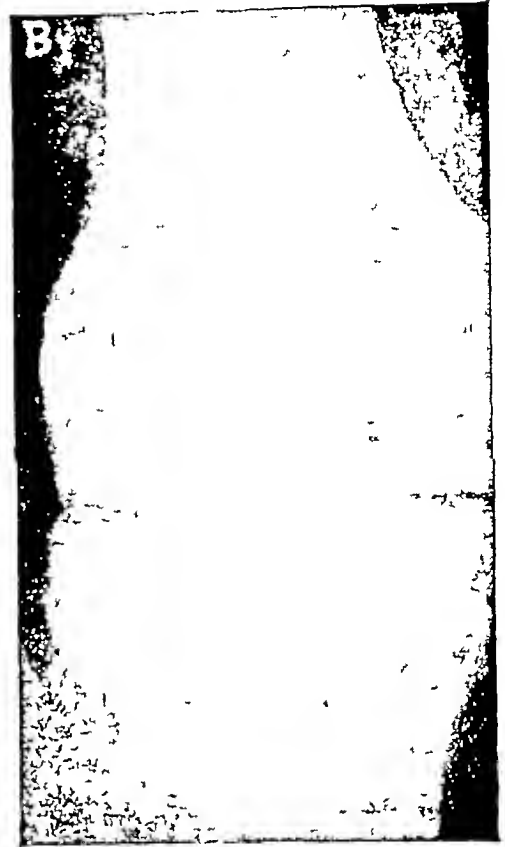


Fig 5. Taken after nine months

### SCIATICA

N, a personnel of the Navy, aged 52, was admitted on 14-8-40 for Sciatica on the left side, the complaint dating since March of the same year. Various treatments were tried during this period with no relief. X-Ray therapy was advised for his condition and the pain was greatly relieved in less than 2 weeks.

### BELL'S PALSY

Patient N, aged 26 years, reported for treatment for a right sided Bell's Palsy on 28-5-43. Duration of illness—24 hours. The Stylo mastoid foramen was irradiated with a moderate dose of X-Rays over a period of about a fortnight. A total of 6 treatments were given over this period. No other treatment was resorted to. The photographs (Figs. 6—9) taken before and after the treatment demonstrate the result. In these cases the best results were obtained in those who reported within 48 hours after the onset of the disease.

### SEPTIC TONSILLITIS AND PHARYNGITIS WITH GLYCOSURIA

Dr N, aged 55 years, was admitted for chronic follicular tonsillitis and pharyngitis with Glycosuria of a fairly severe nature. The cause of the Glycosuria was supposed to be due to the septic condition of the throat, but an operation was thought to be inadvisable due to the age and general condition of the patient. Treatment by X-Rays

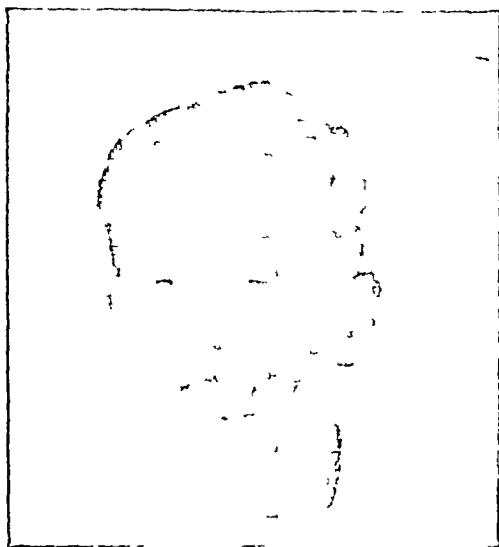


Fig 6 Clinical photo taken before X-Ray therapy showing a right sided palsy

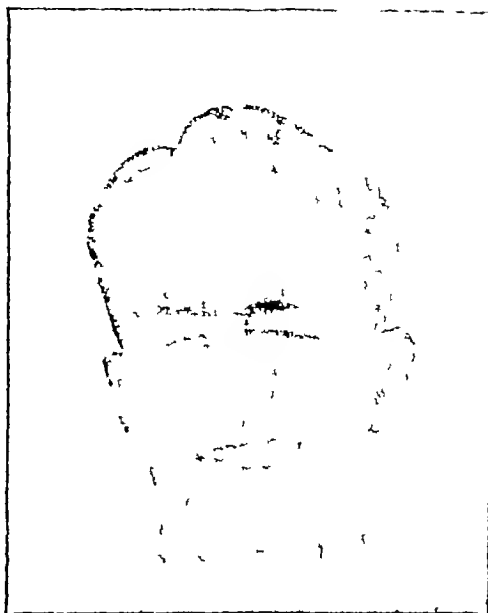
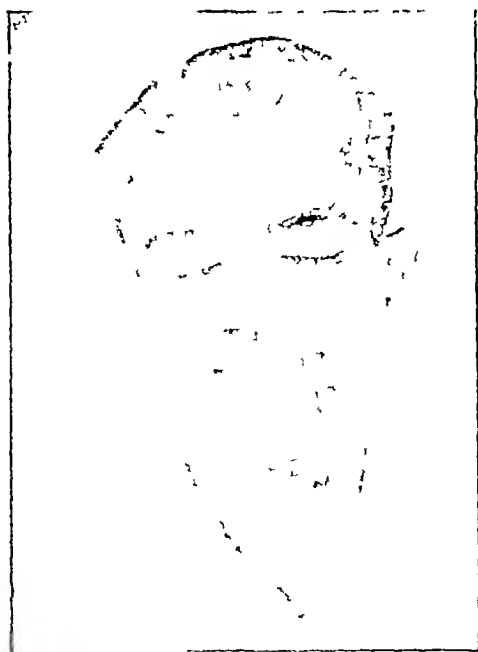


Fig 7 Clinical photo taken after the course of X-Ray therapy shows that the patient is able to close the right eye completely



Fig, 8 Clinical photo taken one month after the cessation of X-Ray therapy. Note the appearance of the Nasolabial fold on the right side

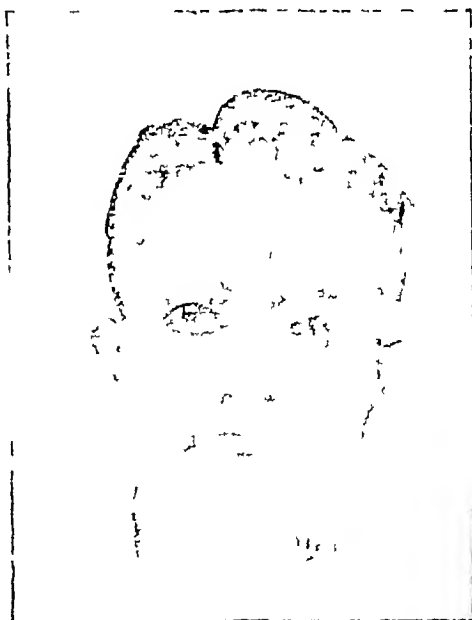


Fig 9 Clinical photo taken one month after the cessation of X-Ray therapy Same as C-appearance almost normal.

to cure the septic condition of the throat was advised. A course of X-Ray treatment by Chaoul's Contact therapy direct to the Tonsils alternately with Deep X-Rays as a general irradiation to the whole pharynx was given over a period of three weeks using a very moderate dose. The septic condition cleared up and with it the sugar in the urine also disappeared which was not controlled before this treatment.

#### DIABETIC CARBUNCLE

G, aged 45, admitted on 25-11-42 for a diabetic carbuncle on the nape of neck, extending from the posterior border of sterno mastoid of one side to the other. Patient's temperature ranged from 102° to 103°F. Patient was put on X-Ray therapy. After the 3rd treatment, pain came down considerably and the temperature tended to fall and by the end of the treatment there was resolution of the local condition with complete disappearance of pain.

#### POST-OPERATIVE PAROTITIS

S, aged 40, was admitted on 16-9-42 for treatment of Post-operative Parotitis. Gastro-jejunostomy and Appendicectomy was done on the patient on 9-9-42. Three days after the operation patient developed a high temperature with pain and swelling over the left parotid region. The pain and swelling were worse on the following days, there was trismus and the temperature and pulse kept on raised. After local treatment for 4 days, patient was referred for X-Ray therapy. He was put on a moderate dose. The local condition greatly improved after the second treatment, trismus disappeared, pain and swelling were much less, but temperature kept on high though not to the same extent as before. After the 6th treatment there was complete resolution of the condition and the temperature was normal. (Vide fig 10, page 19)

#### ACUTE OSTEOMYELITIS

Mr C, a L.A.C. of the Air Force, aged 27, was admitted on 4-8-42 for Osteomyelitis of the Right Index finger after a septic compound fracture of the base of the distal phalanx involving the joint. He was treated by X-Ray therapy and in about 10 days there was complete resolution of the Osteomyelitis. Radiographs taken later revealed a partial bony ankylosis of the joint.



Fig 11 Skiagrams taken before X-Ray therapy



Fig 12 Skiagrams taken after X-Ray therapy

## BRONCHIECTASIS

A, aged 45 years, admitted on 7-5-40 for treatment of Bronchiectasis of left lung (lower lobe), the diagnosis being confirmed by Bronchography with Lipiodol. The complaint existed for nearly 3 years. Deep X-Ray therapy was given, a fairly large dose (-225 r) being given at each treatment. The treatment extended over a period of nearly 5 weeks and a total skin dose of 4500 r was given by different ports of entry. At the end of the treatment the condition greatly improved, and his pain which lasted for nearly 3 years completely disappeared with great reduction in the quantity of expectoration. Two years later patient was in fit condition doing active service. There was no recurrence of symptoms at any time after the treatment. The above is an example of a chronic condition treated by X-Ray therapy. It will be noticed that (1) the duration of treatment is longer and (2) a larger dose is necessary.

## UNRESOLVED PNEUMONIA WITH PLEURAL EFFUSION

Miss U D, aged 5 years. This child was admitted into the Govt General Hospital, Madras, under the Professor of Medicine with a history of fever and cough for over two months. On admission the child was running a temperature rising up to about 104°F in the evenings, a pulse rate varying from 150 to 160 per minute and a respiratory



Fig 13 Radiograph taken before the commencement of X-Ray therapy shows a dense opacity of the whole left side of the lung with displacement of the right border of the heart slightly towards the right side

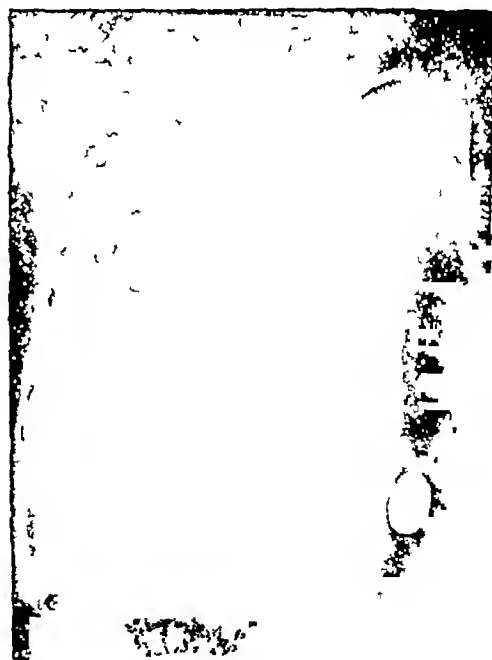


Fig 14 Radiograph taken soon after the conclusion of X-Ray therapy course shows that the density is considerably reduced and the right border of the heart has returned to its normal position. The residual opacity is due to pleural thickening

rate of 56 to 60 per minute. On examination it was found to have a consolidation of the whole of the left lung due to a diffuse unresolved Broncho-pneumonia with pleural effusion. This was confirmed by Radiological examination. Blood examination showed a

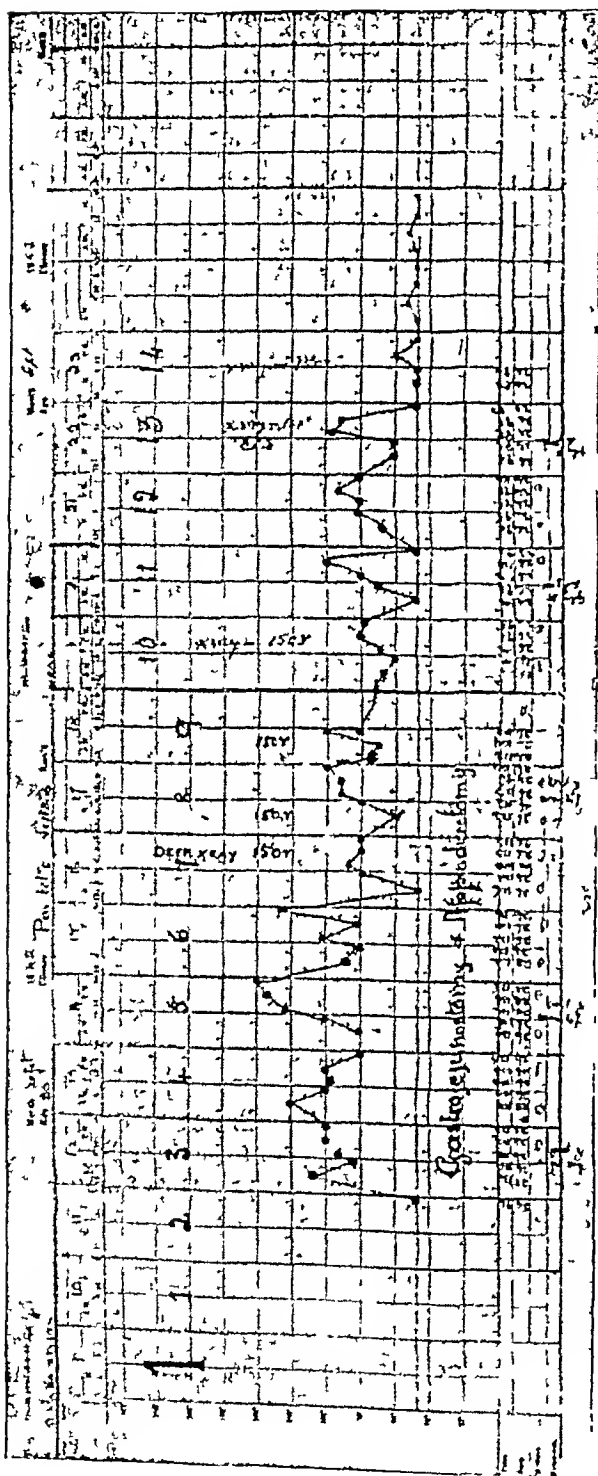


Fig 10. Fourth hourly chart of the case of Post-operative Parotitis after an abdominal operation (p 103)

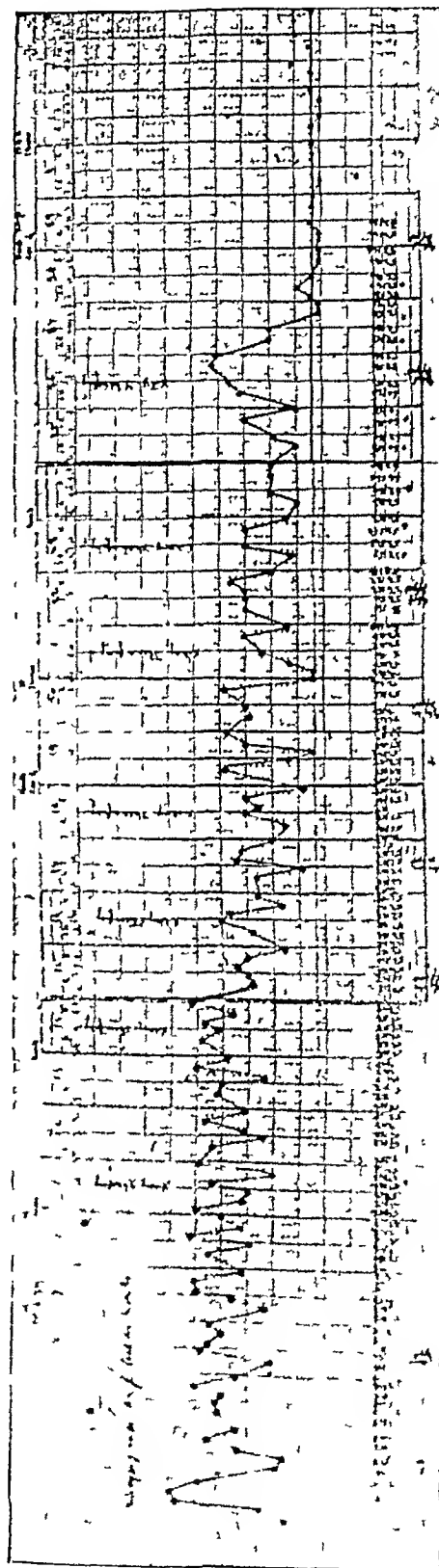


Fig 15 Fourth hourly temperature, pulse, and respiratory charts of patient U D unresolved pneumonia (p 104)

leucocytic count of 22,000 per c.mm The condition of the patient was very poor A course of Chemo-therapy was tried with no amelioration of the symptoms It was then decided to give a course of X-Ray therapy and the treatment was started on 11-9-42 A very small dose of 30 r was administered on the first day and the reaction watched It was observed that within about three hours after the treatment the pulse rate dropped down to 140 per minute and the respiratory rate to 50 per minute, with slight amelioration of the distress The treatment was repeated two days later with a dose of 50 r and these treatments were repeated on alternate days until a total of 400 r skin dose over the chest was given when the temperature dropped down to normal Thereafter the patient had an uneventful recovery though the convalescent period was fairly long due to the very low condition of the patient. The Radiographs taken before and after treatment are reproduced below as also the temperature chart. (Figs 13, 14 and 15)

#### CALCIFICATION OF SUPRA-SPINATUS TENDON

Patient Miss R C, aged 25 years, nurse by profession was admitted for treatment for the above condition. On admission the patient had acute pain on the right shoulder joint, arm in slings, the movement of the joint being limited in all directions, particularly that of abduction. The greatest point of tenderness was on the external aspect of the shoulder joint

*Duration*—10 days of acute pain



Fig 16 Skiagram taken before treatment showed calcification of the tendon to an extent of about  $\frac{3}{4}$  inch in length This patient was given fractional doses of deep X-Ray therapy After the third treatment, the pain was considerably relieved and the movements were more free Another three treatments were given—a total of six exposures in 10 days (a total of 900 r) with complete relief of pain and freedom of movement



Fig 17 Radiograph taken soon after the completion of the course shows complete disappearance of the calcification

#### CELLULITIS OF THE FACE

Patient D, aged 45 years was admitted into the words of one of the Surgeons in the Govt General Hospital, Madras, on 4-3-44 for Cellulitis of the face

*History of the case*—The complaint started with a small pimple over the middle of the upper lip which he squeezed. This resulted in a cellulitis of the upper lip and face as shown in photographs A & B (Figs 18 and 19) with a temperature of 103°F. A course of Cibazol treatment did not influence either the spreading Cellulitis or the temperature. It was then decided to treat the condition by X-Radiation.

X-Ray therapy was commenced on 6-3-44 and on four successive days a daily dose of 200 r was given when the temperature dropped down to normal with great amelioration of the local condition. Photographs C & D show the condition of the patient 12 days later resulting in complete resolution of the lesion. No other treatment was resorted to. Photographs at the end of the treatment and the temperature chart are shown in Figs 20—22.

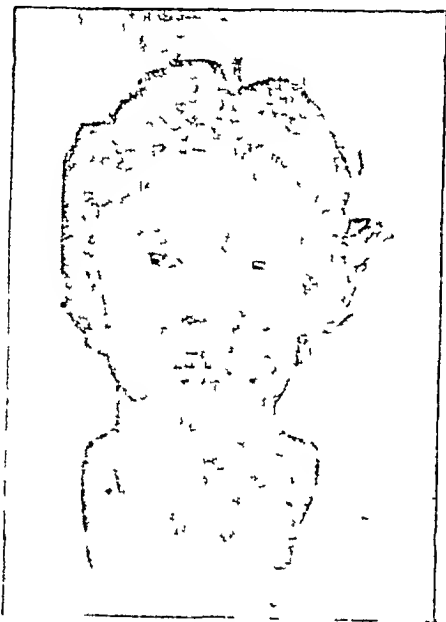


Fig 18

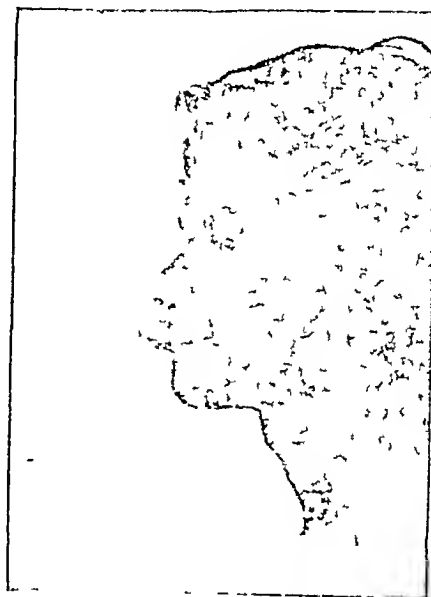


Fig. 19

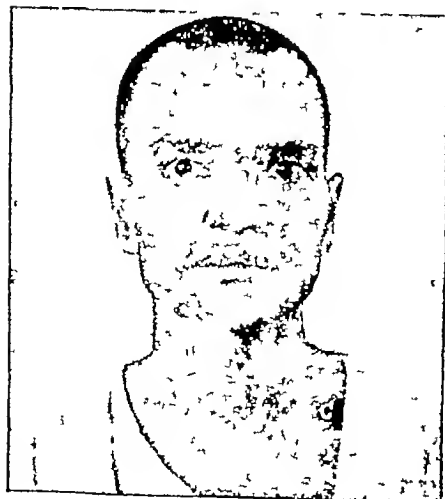


Fig 20

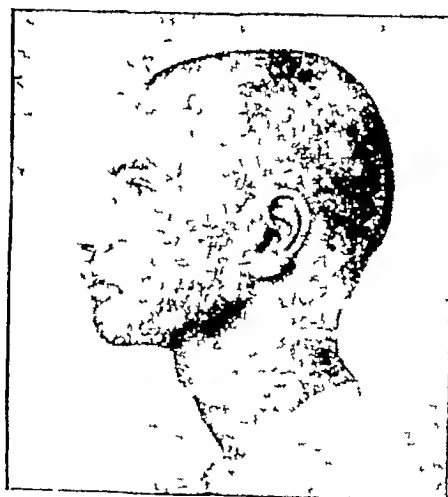


Fig 21

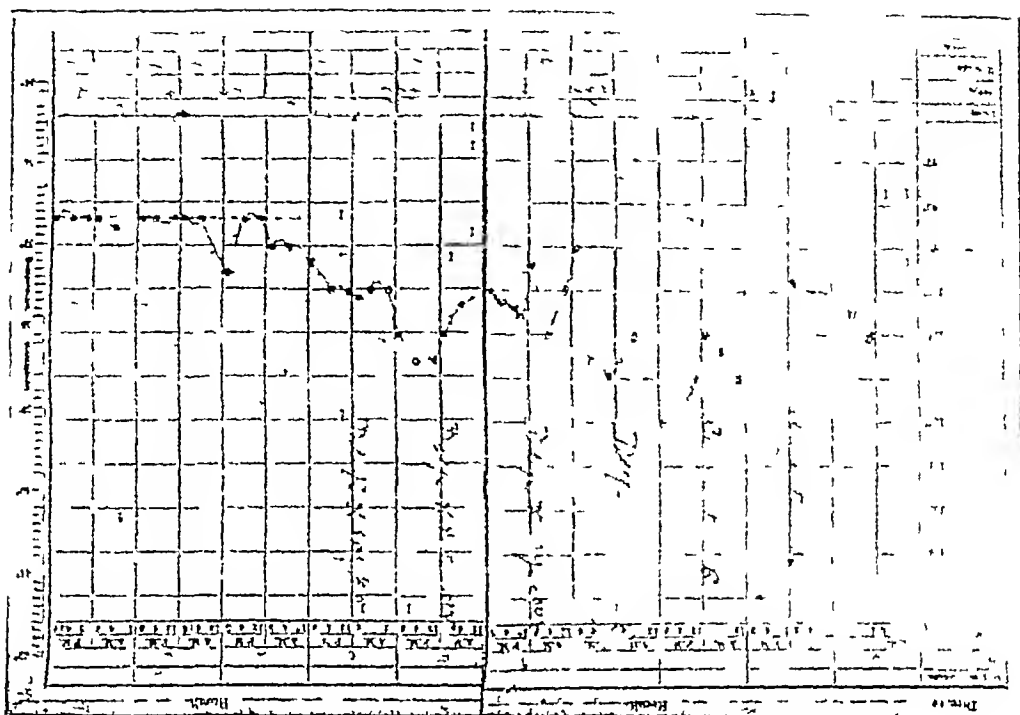


Fig 22 Temperature chart of patient with Cellulitis of the face

### Summary

1 A series of over 1000 cases of inflammatory conditions treated at the Barnard Institute of Radiology, Govt. General Hospital, Madras, during the last four years has been presented

2 This paper presents a wide variety of inflammatory diseases in which the beneficial effects of X-Ray therapy have not been reported hitherto

3 The results obtained have proved beyond doubt the efficacy of X-Ray therapy in these conditions and it has become more or less the treatment of choice in this hospital

4 The experimental basis of X-Ray therapy in inflammatory conditions has been discussed

I wish to thank Col G R McRobert, CIE, IMS, Superintendent, Govt General Hospital, Madras, for his kind permission to publish this paper and to make use of all the clinical materials of the Hospital. I also wish to express my grateful thanks to all the physicians and surgeons for their kind co-operation in this work without which it would not have been possible to carry out this line of treatment. My thanks are in no less measure due to all my assistants who had been of great help to me right through this work.

# INJURIES OF THE THORAX\*

BY

C S PATEL, F R C S (ENG),

Injuries of the thorax, howsoever slight, call for the utmost care and caution in treatment for the reason that even apparently superficial wounds may result in serious damage to the enclosed vital organs and structures and grave disturbances in cardio-respiratory functions and are not infrequently complicated by sepsis which obviously must, to a large extent, adversely influence prognosis

Our knowledge of thoracic injuries, their pathology, diagnosis and treatment has been considerably enhanced since the Great War of 1914-18. It is true that until the present War it was not usual to come across severe injuries of the chest in civil practice and experience in such conditions was largely confined to military surgeons, who had dealt with casualties in the field

In the present total war, however, unarmed civilians well away from the front line and unfortified towns are subjected to aerial bombardment and the proportion of chest injuries among the civil population has assumed much larger proportions than previously

It will be a fair estimate, I think, if chest injuries in ordinary civil practice are taken as a third of all the body injuries. This comparatively large proportion is due to the fact that the thorax forms not only a large and exposed part of the body but is particularly vulnerable to trauma

In a city like Bombay, it is usual to come across one or two cases of stabs in the chest, admitted in hospital weekly as an average in ordinary times. During communal riots, which unfortunately break out in Bombay from time to time, the proportion of chest injuries due to stabbing naturally increases in common with other types of wounds. Generally speaking, injuries of the thorax admitted to hospital during communal riots, are treated on the same lines as those on the field, though the latter group are naturally of a more extensive and serious nature

Judging by my own personal experience in Bombay at the J J Hospital, sucking wounds of the chest appear to be more common during communal riots. As the pen-knife is generally used for stabbing, this type of wound is caused by the see-saw cutting movement of the knife after penetrating the chest

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\*A paper read before the V Annual Conference of the Association of Surgeons of India

This paper, is an attempt to classify and consider the treatment of the common injuries of the chest as met with in civil life and to put forth a plea for a more active line of treatment than that hitherto followed

It need not be emphasised that a thorough conception of the anatomy and physiology of the thorax and its contained viscera is essential for the proper management of these cases. It is beyond the scope of this article to deal with these facts, but it must be fully realized that an appreciation of these facts is very necessary for the understanding of the disturbances produced by these wounds and for the application of the principles of treatment

*History*—Modern thoracic surgery has been developed during the last 30 years. Twenty-five years ago Helyar in his discussion of thoracic surgery concluded, "Thoracic Surgery was devoid of positive results in human beings"

In western literature the traumatic and inflammatory conditions of the chest were known to ancient surgeons. Surgery of the lung and pleura has its origin dating from a time even before Hippocrates. Euryphon, the clinician of the Cnidion School treated empyema with cautery. His clinical description of empyema was surprisingly accurate

Hippocrates clearly described signs and symptoms and types of empyema thoracis and treated by incision and drainage, empyema and abscess of the lung. He writes in his aphorisms "When an empyema is treated by cautery incision, and if the pus is white, the patient lives. On the other hand if it is blood stained, slimy and foetid, the patient dies"

Similarly, wounds of the chest wall have claimed the attention of early writers. On account of their frequency during wars, signs and symptoms of the wounds were known and their different types had been recognized. A thoracic wound exhibiting the escape of air was a proof of an open pleura even in those days. Celsus describes the bloody foaming sputum and dyspnoea due to an injury to the lung

It is surprising however that pneumothorax and subcutaneous emphysema did not receive proper attention until the time of Ambroise Pare, he was the first to describe subcutaneous emphysema after wounds of the lungs. John Hunter describes the symptom of tension pneumothorax following a wound of the lung caused by a sword. Pneumothorax or internal emphysema as it was called, was first described in the 18th century. Hewson who coined the word pneumothorax recognized the fact that adhesions in the pleura prevented the formation of pneumothorax

Surgical treatment for haemorrhage from the chest wall followed soon after. For the arrest of bleeding some used cautery, others used packing, while a third group used ligature

Richter (1742 to 1812) thought of differentiating the injuries of the chest-wall from those of the lungs, by putting a playing card between the ribs. If the blood flowed over the top side of the card, it was presumed that it came from the intercostal artery, while if it came from the under-surface of the card, it was supposed to be coming from the lung.

Pneumothorax received the greatest attention and people began to understand the principle of immediate closure of traumatic pneumothorax. Larrey (Surgeon to Napoleon) (1766-1842) was the first man, who treated wide open wounds of the chest-wall by applying air-tight dressings. This was done to control open pneumothorax. Dieffenbach, shortly afterwards, performed the operation of immediate closure of the wound by suture.

Schick, Schmidt, Block, and Biondi carried on experiments on wounds in animals (1881-82) and proved that animals could withstand severe operations on the chest. Garrie, Tuffier, Koenig and Murphy exploited this knowledge and did some operations on the chest.

The German Clinic in 1904 introduced positive differential pressure methods in anaesthesia to control the effects of open pneumothorax during operations and thus solved many intricate problems of intra-thoracic manipulations and gave an impetus to the development of thoracic surgery.

All previous knowledge was forgotten in the middle ages. The Napoleonic Wars gave a chance to revive interest in thoracic surgery. In spite of this, even at the beginning of the nineteenth century, Dupuytren, Astley Cooper and others considered operations on the thorax most dangerous.

The surgery of the heart upto 1896 was an avoided subject, but in that year Rehn of Frankfurt in Germany succeeded in suturing a penetrating wound of the right ventricle. He demonstrated this case before the German Surgical Society in Berlin in 1897.

Hippocrates believed that a wound of the heart was deadly and necessarily fatal. The same version was accepted and emphasized by Aristotle, Celsus, Galen and by many others. However, it was recognized that the fatal result could be delayed if the missile is left undisturbed. Subsequently Fallopius, Paul and Herman emphasized the dangerous nature of wounds of the heart with the same emphasis as Hippocrates and others.

History records that Epaminondas consented to the removal of the weapon from his heart only after he had heard of the victory of the Thebans. Early in the 16th century Hollerius, doubted the verity of the accepted belief and Cabridanus described two cases of unhealed wounds of the heart in 2 persons who were hanged and he believed that wounds in the heart need not be fatal. During the 17th century, Morgagni had recognized the fact that it is the filling up of the pericardium with blood that is

responsible for the cessation of cardiac function Senac stated about the 18th century that non-penetrating wounds of the heart need not be always fatal Ottowroth drew the logical conclusion from the above facts that the life of the patient can be saved by enlarging the opening in the pericardium to allow the exit of the blood

It was, however, left to Ambroise Pare to say that wounds of the heart could heal Baron Larrey and Oliver reported many cases of healing occurring in wounds of the heart Larrey had drained the pericardium in the case of a heart wound. In 1881 Callendar suggested that heart wounds could be sutured.

All these facts were often in the minds of many surgeons, but nobody put these facts into practice Even towards the end of the last century Theodore Billroth made the statement "The Surgeon, who would attempt the wounds of the heart would lose the respect of his colleagues" Stephen Paget made similar statements saying, "No new method or no new discovery can overcome the natural difficulties that attend a wound of the heart"

Block performed suture experiments on rabbits in 1882 The paper published by Fisher gave many references about the knowledge of the ancients regarding wounds of the heart Many unsuccessful attempts by Farina, Cappelen and others were made for suturing wounds of the heart till a successful attempt was made in Germany in 1896 This was the first successful attempt and in Shareman's words, "The road to the heart is only 2 to 3 cm in a direct line, but it has taken surgery nearly 2400 years to travel it" The surgery of the heart had at last begun

Thoraco-abdominal wounds were known to the ancients The injuries inflicted upon Polydorus and Troos by Achilles and on Sarpedon by the spear of Patroklos referred to in the Homeric epic proved fatal Surgery of these regions is also not modern Ambroise Pare described the behaviour of wounds of the diaphragm Guthrie, Larrey and others have treated these types of injuries during the Napoleonic era A considerable advance has been made in the understanding of the principles of these injuries after the last World War

Similarly considerable advance has been made in the subject of Anaesthesia The positive pressure anaesthesia which was in use prior to and during the War is now thought to be dispensable The introduction of the Carbon dioxide absorption chamber, the improved technique of controlled respiration and the administration, in some cases, of local anaesthesia have simplified most of the intra-thoracic manipulations

This state of uncertainty continued till the end of the 19th century and nobody thought of waging an attack against the intra-thoracic organs, as was

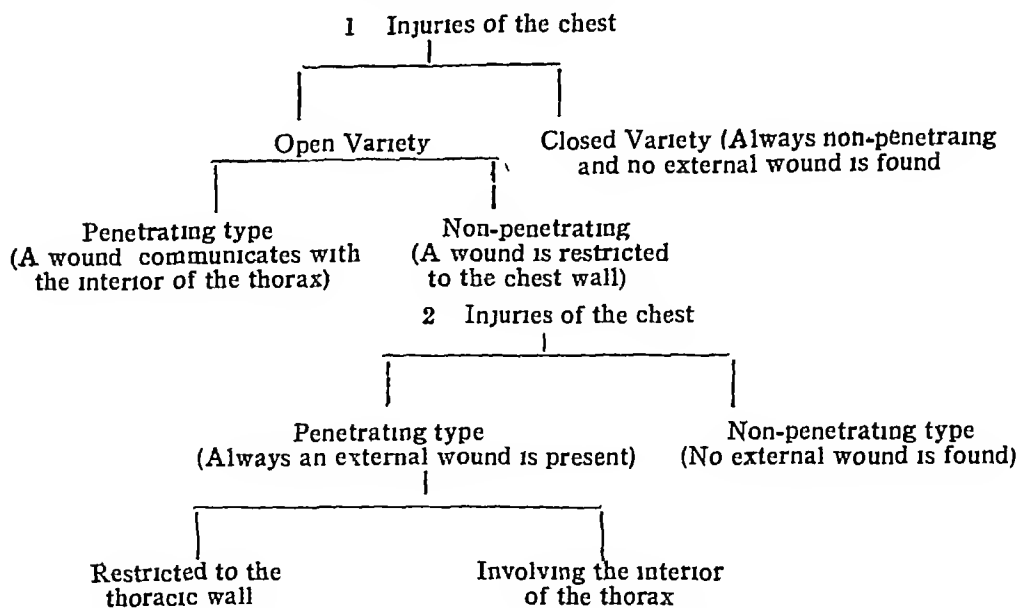
done in the peritoneal cavity The names of Murphy, Tuffier and Sauerbruch will go down in history as pioneers in this direction

The chief causes of the advance may be considered under the following heads —

- (1) Modern aseptic conditions of operation
- (2) Developments in X-ray technique
- (3) Positive pressure anaesthesia
- (4) Better understanding of the mechanism of the intra-thoracic organs

The World War No I afforded further chances of study of thoracic injuries Wide exploration can now be undertaken and much of the awe of opening the chest has been done away with

*Classification* —Injuries of the thorax present a most difficult problem for anyone to aim at a standardized and satisfactory classification as they involve simultaneously many structures in the thorax The consideration of various complications and their manifestations is another question which adds to the difficulties in the classification of these injuries I have adhered to the usual way of classifying these injuries into two main groups viz, penetrating and non-penetrating or open and closed types This grouping could be expressed in two different ways as follows —



I have utilized in this paper the second classification for further description of these injuries, under the main headings which are given below Penetrating injuries as mentioned in this paper are those which are caused

by sharp objects, bullets, etc and they may remain limited to the thoracic wall only or may involve the interior of the thorax as well and as such they always produce an external wound. Non-penetrating wounds are caused by crushes, compression and run-over accidents and they have no external wound. It is clear that injuries of the penetrating type cause open or closed wounds while the injuries of non-penetrating type cause only closed wounds of the thorax. None of the methods of classification have been satisfactory, and even this way of grouping the injuries, is inadequate for the simple reason that the non-penetrating type of injuries may carry with them considerable damage to one or many organs with very wide and severe physiological derangements of the cardio-respiratory system without any evidence of external trauma on the chest-wall.

The following is the broad scheme I have used in the description of injuries of the thorax —

- 1 Injuries of the chest wall
- 2 Injuries of the lungs and pleura
- 3 Injuries of the heart and pericardium
- 4 Injuries of the mediastinal structures
- 5 Injuries of the thoraco-abdominal organs

Conditions like commotio thoracis, traumatic asphyxia and blast injuries of the chest-wall have been grouped together with the injuries of the chest-wall for the purpose of giving a more clear idea, rather than with the organs under their respective headings even though these conditions are the manifestations of transient or more obvious trauma with visceral damage.

### 1 Injuries of the Chest-wall

These are injuries which are limited to the thoracic wall and they are quite simple and do not differ in any way from injuries of other parts of the body. They may give rise to abrasions, contusions, or haematomas on the chest-wall which are of very little importance. Wounds restricted to the chest-wall do not call for any serious attention. There may be surgical emphysema round about for a short distance due to air being sucked in by the respiratory movement. The penetrating wounds complicating the viscera are certainly more serious.

*The non-penetrating type of chest injuries* are caused by direct blows, or by severe crushing type of injuries caused by a vehicle, cart or automobile, running over the chest. This may be associated with a fracture of one or more ribs, the ends of which may penetrate the underlying organs and cause very many serious consequences like, pneumothorax, tension pneumo-

thorax, haemothorax, etc. The fracture caused by blows or less severe direct violence do not cause much trouble. They are simple fractures. Their diagnosis is determined by local tenderness and pain which may be elicited either by local pressure or by compression of the chest and confirmed by radiograms.

The severe crushing type of injuries of the chest may be associated with fractures of several ribs at one or more sites, with the result that the rib fragments between these points get loose and depressed at each inspiration and protrude out at each expiration producing paradoxical respiration equivalent in its effects to an open pneumothorax. The usual site of the fractures correspond anteriorly to the mammary line and posteriorly to the posterior axillary line or to the scapular line. This "Stove in chest" condition is very often associated with visceral injuries of a severe type resulting in haemothorax, pneumothorax and emphysema which may call for urgent attention to avoid serious catastrophe. The stove-in chest may be bilateral.

*The treatment for simple fracture* consists in immobilization of the chest-wall secured either by adhesive strapping in layers one over the other applied to the affected part of the chest beginning from below upwards, each strap being applied at the end of expiration or by strapping the lower part of the chest all round only, irrespective of the site of fracture. The latter method I have used with great satisfaction and it ensures better fixation and comfort. Injection of alcohol into intercostal nerves has been suggested as a measure of treatment and has been tried with success in some of the cases. Also lately the injection of percaine (1 in 1000) 10 c c with adrenaline has been suggested. The treatment for "Stove-in chest" is not only directed to immobilization of the chest but also to the shock which frequently accompanies this condition. A close and careful examination of the chest to determine the presence of any visceral damage and the institution of the needful measures to deal with tension pneumothorax, haemothorax, etc. if present is imperative.

*Fracture of the sternum* may be due to direct violence such as by blows but is most commonly the result of indirect violence following forcible flexion or extension of the spine which also is often fractured. Fracture of the sternum is usually associated with damage to intrathoracic organs. Its occurrence is rare. The diagnosis is not difficult because of the over-riding of the lower fragment over the upper one. Exceptionally displacement may be absent.

*The treatment* consists of strapping the chest if there is no overriding of fragments. Hyperextension of the spine may be necessary for the reduction of the deformity if it is present and this may be secured by having the patient lie on a sand-bag or pillow between the two scapulae. If the frag-

ments are irreducible, open reduction and fixation will be necessary to relieve dyspnoea

### COMMOTIO THORACIS

It is a condition of intense shock, following severe non-penetrating injuries of the chest which may end in recovery or in death and is comparable to concussion of the brain. The patient is unconscious. Other signs and symptoms of shock are present. This condition has been known to occur in the last war in soldiers who were near exploding shells without any evidence of being struck. Severe emotional strain has been held responsible for this condition. Post-mortem examination does not usually reveal any visceral injury and thus cannot explain the cause of death. The treatment consists in the application of appropriate measures used in the treatment of shock.

### TRAUMATIC ASPHYXIA

Traumatic asphyxia also known as "Masque ecchymotic" is another extraordinary condition which is sometimes seen following non-penetrating crushing injuries of the chest such as crushing by the weight of heavy objects, by falling masonry and in diving accidents in which a person gets doubled up and is due to violent though brief compression of the chest or the abdomen or both with, or without, any accompanying injury to the thoracic wall or its contents. The condition usually occurs in young people whose thoracic walls are sufficiently elastic not to receive severe damage itself. The face, neck and the shoulders and the upper part of the chest of the patient show intense deep violet-blue discolouration and a brilliant conjunctiva. The swelling and oedema of the tissues of these areas and particularly of the lips and lids are often noteworthy features of this condition.

There may be numerous ecchymotic or petechial haemorrhagic spots involving these areas and the pharynx and mouth. The patient may be unconscious. Ocular and visual disturbances have occurred ending in recovery or permanent blindness with progressive active optic atrophy, this may result either from retinal haemorrhage or degenerative changes due to vascular stasis with oedema. Pressure does not remove the discolouration. The discolouration is absent on areas which are the points of pressure on the underlying skin, viz., sites of wearing the hat, collar stud, etc. This condition is supposed to be due to sudden obstruction of the Superior Vena Cava of so violent a nature as to set up a wave of back pressure in the veins of the head and face and distension of the entire venous and capillary area drained by these vessels. Distension of these veins occurs as a result of the paresis of the vessel walls,—the causative factor being anoxaemia produced during the length of time the thorax is compressed. This obstruction is transitory

occurring only at the time of injury and the patient usually recovers provided there are no other associated lesions, such as, fractures of the ribs or intra-thoracic lesions like haemothorax, laceration or rupture of the lung or abdominal lesions like laceration of liver, kidney, the diaphragm and other viscera. The majority of the patients recover without any special treatment in the absence of complications. The treatment is directed to the management of shock and of any associated lesions.

### BLAST INJURIES

Blast injury to the lungs is another type of non-penetrating chest injury which is being recognized as a distinct clinical entity in the present world war. This has occurred in individuals who are exposed to the detonation of high explosive bombs. The high explosive bomb on reaching the ground or in cases of time bombs, some time after reaching the ground, sets off the explosive charge which may be as much as 3 to 3½ tons in some cases, the going off of the explosive produces quantities of gases within the bomb-case leading to pressures estimated at between 4 to 5 hundred tons per square inch. Under this stress the casing bursts liberating the highly compressed gases suddenly. This sudden liberation of gases under very high pressures produces the blast wave and its effects. The blast wave has a pressure component and a suction component. The former is stronger than the latter. The larger the explosion, the greater is the magnitude and the nearer the object is to the point of explosion, the greater is the effect of the pressure wave on the patient. In outward expansion the pressure wave may tear any object to pieces and blow them far away. The suction wave is as the result of backward movement of air following the pressure wave which drives the objects nearer the centre of explosion. As a rule these by themselves do not cause death. Besides the effects of blast there are other additional factors which may be responsible for other injuries of the body. These factors are that the individuals may be hit by splinters or may be burnt by the flame of the explosion or may be poisoned by carbon monoxide and in other cases the blast wave may throw an individual against hard surfaces or he may be hit by other falling objects such as glass, furniture, wood or walls, floors, ceiling, etc. It is open to discussion whether blast wave alone can cause a death. Post-mortem examination reveals intrapulmonary capillary bleeding particularly in the upper lobes and the margins of the lungs, sometimes over large areas in which the bronchi and alveoli are filled with blood. Markings of the ribs on the lung surface are found and sometimes haemothorax is present. In mild cases the signs and symptoms will be—very irritable cough, blood-stained frothy expectoration, diminished chest movements, fullness of the chest, impaired resonance, cyanosis and restlessness and dyspnoea of a severe degree. X-ray suggests diminution of movements and

small and multiple shadows suggesting a loss of translucency of the lungs. Extensive superficial burns, multiple fractures, splinter wounds and injuries in the abdomen and nervous system, etc are frequently found

The treatment consists in giving perfect rest which may be secured by the administration of morphine in repeated doses to alleviate pain and to ensure quietness. The continuous use of oxygen is of inestimable value. Shock is almost invariably present in this condition which requires judicious management. Transfusion of blood or intravenous injections of glucose in large quantity are withheld in the early stages for fear of pulmonary oedema, as there is already haemorrhage which may be accentuated as a result of transfusion. Patient should be propped up and be made to lie on the most affected side to prevent respiratory embarrassment and aspiration of effused blood into the normal lung. Pneumonia is a common sequel. Other associated injuries like fractures, burns, etc should be appropriately treated. The Sulphanilamide group of drugs may be administered to prevent infections at a later stage.

## 2 Injuries of the Lungs and Pleura

In civil life chest wounds are caused either by blunt trauma or by sharp instruments. They, as a rule, behave as closed wounds except in some cases of severe trauma caused by sharp instruments. In such cases the wounds produced are often known as "Sucking Wounds". The closed wounds, as a rule, do not cause much disturbance in cardio-respiratory physiology and they carry with them the least possible chances for infection. In very rare cases where the damage to the intrathoracic organs is of a severe type, infection may occur. This possibility is increased if trauma is inflicted on diseased lung. In civil life the injuries of the non-penetrating type involving lung and pleura are caused by runover accidents, by falling of heavy weights on the chest, by compression between two heavy objects or by direct heavy blows on the chest. Wounds of the penetrating type are most commonly caused by knives, by bullets or by any other sharp instruments or pointed objects.

In military practice the chest wounds involving lung and pleura are caused by explosive, blasts by shrapnel and shell fragments, and by bullets and gunshots. Other objects such as glass, girders, furniture or wood pieces flying about or walls, ceilings, falling over the chest also bring about injuries of the lung and pleura. Wounds of the penetrating type in military practice very often assume the character of "open sucking wounds" and frequently these injuries carry with them dirt, debris and other foreign bodies like shell fragments and clothing which favour considerably the incidence of infection. In such cases the anaerobic organisms play the predominant part in the infection of chest wounds. Besides, these wounds are very extensive in

which damage to the intra-thoracic organs, marked derangements in the functions of cardio-respiratory system, haemorrhage, pneumothorax, emphysema and shock are pronounced

### NON-PENETRATING INJURIES

The reaction to non-penetrating injuries, depends upon the elasticity of the chest-wall. In young people a severe laceration of the lung root, may occur in the absence of any demonstrable evidence of injury to the chest-wall itself, though such injuries are usually associated with severe contusion of the chest wall, often accompanied by fractures of the ribs or the sternum.

Simple contusion of the pleura and lung without any actual wound of these structures does occur and may be followed by a traumatic pleurisy with or without effusion. More serious complications may follow even simple contusion of the lung. The pathological lesion in the lung varies with the degree of trauma. In simple contusion, there may be subpleural haemorrhage. These areas of haemorrhage may be very small or sometimes may involve part or whole of the lung depending upon the severity and degree of injury. The lung tissue is infiltrated with blood. The bronchial vessels may be pressed upon by the extravasated blood collected in the surrounding tissues and this may lead to nutritional disturbances in the area supplied by these vessels. These areas may be peripheral or central and if by chance, an infection supervenes, a lung abscess may result sometimes followed by gangrene. The infection of the pleura by bursting of a peripheral abscess of the lung following these contused areas is not an uncommon incident.

Rupture of the lung is another event met with in non-penetrating injuries of the chest. This may occur either as a result of sudden increase in the intra-pulmonary pressure brought about by a fit of ceaseless coughing as in whooping cough or as a result of violent compression of a lung produced by severe crushing chest injuries, particularly if at the same time a reflex closure of the glottis occurs. Ruptures of varying extent and character are found in severe lesions. There may be multiple ruptures of the lung running in various directions even leading to complete severance of the organ from its root. These ruptures may be subpleural or central with an intact visceral pleura or may be complete penetrating ruptures. In some rare cases these ruptures may be limited in the central area. If it is small, it may heal or in rare cases it may form the nidus for the development of an abscess. Tears of the lung also occur as a result of penetration by the ends of fractured ribs. It should be realized that contre-coup injuries of the contralateral lung does occur and the lesion may be even more serious and extensive than on the side where the actual force is applied. This contre-coup injury produces pleurisy with or without effusion, pneumonia, massive collapse of

the lung, etc and it is likely to be overlooked, as in the cases of the injuries of the brain, if this is not constantly borne in mind

The clinical signs and symptoms of rupture of the lung are pneumothorax, haemothorax, emphysema and hemo-pneumothorax, if the wound in the lung is of valvular type, tension pneumothorax results. There is heavy breathing, cyanosis and low volume pulse. The diagnosis of rupture of the lung may be presumed in non-penetrating injuries of the chest when these signs are present.

Laceration of the lung may occur as a result of fractured ribs deeply penetrating into it. Severe laceration is more commonly associated in "Stove-in-chest" injury where multiple fractures of the ribs occur, as aforesaid this injury may occur on both the sides and the separated segment of the chest wall may be deeply driven into the lung causing severe laceration. Laceration of the lung may be accompanied by symptoms and signs similar to those found in rupture of the lung with a difference of degree rather than that of kind. Serious haemorrhage may occur if a large blood vessel is torn. If the lung is adherent to the chest-wall prior to the injury, subcutaneous emphysema develops at the site of the injury. Laceration of peripheral portion of the lung produces pneumothorax and it is rarely accompanied by a large haemorrhage though a moderate degree of haemothorax is usually present. The haemothorax may assume large proportions if the bleeding is from the internal mammary or an intercostal vessel.

In severe forms of injuries, shock invariably occurs following the injury and is frequently of an alarming character. Dyspnoea, cough, hemoptysis and cyanosis are the usual accompaniments of these injuries. The presence of air in the pleural cavity, subcutaneous or mediastinal emphysema, and sometimes signs of tension pneumothorax are usually associated with non-penetrating injuries. Gangrene or abscess of the lung, empyema, lobar or lobular pneumonia may follow later as complications of these injuries.

#### PENETRATING INJURIES OF THE LUNG

Penetrating injuries of the lungs and pleura are far more common than the non-penetrating types. These injuries are more commonly found during warfare. Penetrating wounds of the chest admitted into the J J Hospital during 1934, 1935 and 1936 were about 257. This includes the 110 cases of 1934-35. There were 56 other cases of stabs in which no further details were available. So they are excluded from this number. Out of the 257 cases, 151 were on the back, while 106 were on the front of the chest, the upper part of the chest was more often involved than the lower one. Stabs at the level of the scapula or above, were 215, while below the scapula there were 42. Left side stabbing was slightly more than the right side one. There

was bilateral stabbing only in 6 cases, but there were many cases of multiple stabs on the same side numbering 36. Some of these penetrating stabs were of very serious nature. 11 people died soon after admission to the hospital before any treatment could be given. Out of the 257 cases there were 99 cases of stabs in which penetration involving the pleura, lungs, etc. was caused, while in the remaining 158 the wounds were superficial. Out of these 158 cases, 37 were treated by an operation to clean the wounds. The remaining 121 cases were treated conservatively as they were superficial. Out of 99 penetrating stabs 39 were treated on conservative lines, out of these 8 died, of these 3 died of internal haemorrhage in the thorax. The other three were of multiple stabs but there was no considerable haemothorax, (probably died of tension pneumothorax). In the last two, no post-mortem examination was allowed.

Sixty of these 99 cases with deep visceral injury including thoraco-abdominal organs were submitted to operation. Manifestations of complications with these wounds were haemothorax, pneumothorax, emphysema and collapse of the lung. Haemorrhage was present in 25% out of the 99 cases. Pneumothorax was present in over 40% and emphysema was present in 38%. Severe degree of shock was present in 40% of these cases. If the total number of 257 cases are considered, the percentage of haemothorax, pneumothorax and emphysema will be less. Surgical emphysema and pneumothorax in Elkin's series of 553 cases were 40% in the former and 24% in the latter. Haemothorax was present in 37%. Different workers in this field have put forward the statistical figures in civil penetrating wounds haemorrhage ranging from 25% to 40%, surgical emphysema of 20% to 50%, pneumothorax from 15% to nearly 35%. If the civil wounds carry with them such a high percentage of complications, it is quite reasonable to presume that the incidence of these complications in war wounds ought to be much greater. The incidence of haemothorax in chest wounds in the last world war has been quoted as high as 85% in some of the hospitals.

Penetrating wounds of the chest-wall usually cause visceral injury, but in some cases a wound caused by a knife or a dagger may only affect the chest-wall without involvement of the pleura or the lung. In the above series of 99 cases there were 16 cases of pleural involvement without any visceral injury.

Penetrating wounds of the gunshot type are often associated with severe laceration of the lung. Wounds caused by shrapnel often carry with them dirty clothing or ragged tissues of the chest-wall, which may be embedded in the lacerated lung, and which at a later date may favour the onset of fulminating infection. In the same way a splintered rib may be driven into the lung. A clean wound produced by a high velocity bullet without involving heart and vessels carries a better prognosis than the lacerated wounds.

of the lung. Injuries caused by shrapnel or by tangential bullets are associated not only with a tearing injury of the chest-wall and severe laceration of the lung but also with injuries of abdominal viscera.

Penetrating wounds caused by bullets may or may not have exit wounds. The situation of the wounds varies considerably and bears no relation to the amount of intrathoracic damage. This may be quite out of proportion to wounds in the thoracic wall which may be quite trivial. On the other hand, there may be few symptoms, and foreign bodies such as shell fragments, bullets, or shrapnel, etc. may be retained for a number of years without much trouble.

It is quite obvious from the above description of the varieties of the penetrating and non-penetrating wounds of the lungs and pleura that a common feature of all these wounds is the presence of air and blood in the pleural cavity which is responsible for the creation of marked disturbances in the cardiorespiratory physiology. A thorough understanding of the factors underlying pneumothorax and its varieties, haemothorax and emphysema is necessary for the proper management of these cases. It is for these reasons, some details of these important complicating factors have been given below. Main complications following these wounds of the lungs are pneumothorax, haemothorax, emphysema and massive collapse of one or both the lungs.

### PNEUMOTHORAX

Pneumothorax is one of the common complications of chest wounds and may occur in any injury in which the pleura is torn. Pneumothorax resulting from a wound of the chest may be closed, open, or valvular. The most common of these is the closed variety. Accordingly, it is found in frequent association with rib fracture or with rupture of the lung involving the visceral pleura. It may be unilateral or bilateral. Perforating wounds of the thorax causing pneumothorax may behave as closed wounds, especially in the upper part of the chest, as the external wound gets sealed by the contraction of the muscles or by the formation of blood clot. Pneumothorax of the closed variety is rarely followed by infection. If no infection occurs, the air is gradually absorbed and full expansion of the lung takes place and the patient recovers. Very rarely the wound gets infected by gas forming organisms and this may result in a tension pneumothorax, which condition may need urgent surgical interference. Apart from this, a closed pneumothorax is of little importance.

The second variety of pneumothorax is the open one, in which air can enter and leave the chest cavity without any obstruction. Open pneumothorax is seen when a portion of the chest-wall is torn or stabbed, leaving a wide open defect communicating with the pleural cavity through which air

rushes out with a whistling noise at each expiration and is sucked in with a gurgle into the chest at each inspiration. This is called a "sucking wound of the chest-wall." This causes rapid collapse of the lung which can be seen lying against the mediastinum, and which may bob up at each act of expiration causing "paradoxical respiration." This, in combination with the collapse of the opposite lung, produces a marked diminution in the total vital capacity. This diminished vital capacity has often resulted in a fatal termination even though the wound of the chest was not apparently very serious and there was no involvement of the lung or the other viscera. The effects of the open pneumothorax may be less if the lung blocks the opening in the chest-wall by its protrusion into the wound. This has happened in one of my cases. This variety of open pneumothorax is often accompanied by mediastinal flutter which adds to the cardiorespiratory distress.

The third variety is the valvular pneumothorax or as it is sometimes known as "Internal variety of open pneumothorax." It occurs in cases where there is a valvular wound either in the chest-wall or in the lung allowing the air to enter the pleural cavity but not to leave it. Symptoms become most pronounced if the open pneumothorax of the internal variety becomes a tension pneumothorax. This extra pressure acts on the mediastinum and also on the contralateral lung as well as on the heart and vessels giving rise to marked cardiorespiratory embarrassment. It is clear that there will be no tension pneumothorax if a wide communication between the pleural space and the outside air exists.

### EMPHYSEMA

Emphysema is another complication which occurs in association with chest wounds. This may be subcutaneous or mediastinal, localized or generalized. The subcutaneous emphysema is often seen in wounds of the chest-wall and is produced by air being sucked into the wound during inspiration but during expiration this sucked in air cannot escape perhaps due to the falling together of the wound edges and is then forced into the subcutaneous tissues and this goes on with each respiratory cycle. Subcutaneous emphysema, is often associated with rib fractures or with a wound of the chest-wall communicating with the pleural cavity when a small localized amount of emphysema may be felt round the margin of the external wound. But a generalized emphysema occurs in wounds of the lung only when there is a free communication between the pleural cavity and the subcutaneous tissue. There are cases I have observed of wounds in the chest-wall in which subcutaneous emphysema has spread limited to one side of the chest. Besides, there are other groups of cases in which further spread has been prevented by a sealing process occurring in a tear of the lung, either by a process of formation of visceral layer or by a blood clot which prevents the entry of air from

the lung into the pleural cavity. Air gets gradually absorbed from the subcutaneous tissues without any further trouble. Emphysema is known to occur as a delayed symptom following late pneumothorax.

Mediastinal emphysema is another complication of chest injuries. This condition is associated with wounds of the trachea, the main bronchus or the lung, from which the air escapes into the loose tissues of the mediastinum. More and more air is sucked in into the limited space at each inspiration. It sometimes happens that the tear in the lung in the region of the lung root allows the air to spread into the pleural space as well as into the mediastinum. Wounds of the cervical trachea may cause emphysema in the mediastinum by its extension from the cervical region. Mediastinal emphysema following chest wounds is first seen in the suprasternal notch and proceeds up in the neck and the face, and spreads further to both sides of the chest, upper extremities, and ultimately becomes generalized all over the body, producing a bloated appearance.

*Case History*—A man, about 45 years of age, was admitted in the Balaram wards of the J J Hospital following a motor accident. No evidences of external trauma was detected on the chest. Emphysema soon developed which spread to the neck and the face. His general condition was extremely good. Next day on my round I observed that emphysema had spread all over the body. His face was extremely swollen. Eyes were closed. It was difficult to recognise him as his features were all changed. His general condition remained very good, crepitant feeling and oedema persisted for 4-5 days till its gradual disappearance on the 10th day. The patient made an uneventful recovery.

*Case No 2*—Tuberculous patient aged about 48 years transferred by the late Dr P T Patel from Maratha to J J Hospital for the operation of extrapleural pneumothorax for the treatment of a tuberculous cavity situated in the upper lobe of the right lung. An operation was performed under local anaesthesia combined with general anaesthesia towards the end. While separating the pleura, hard nodules at the apex were felt which were separated with gentle manipulation. After creating a sufficient space between the pleura and the thoracic cage, the wound was closed in the usual way keeping the point of a needle in the cavity between the pleura and the chest-wall. 200 cc of air was injected to keep this cavity patent. Again, after an interval of 6 hours, 155 cc of air was injected. Next morning on my round the patient had a bloated appearance all over the body. He was markedly dyspnoeic and slightly cyanosed. The air was aspirated from the pleural cavity and the created cavity to allow for the re-expansion of the lung. In spite of judicious efforts to relieve this emphysema, the condition of the patient grew worse. The patient died on the third day. The post-mortem examination revealed collapse of the lung with a cavity in the upper lobe of the right lung, surrounded by a hard growth. Sections of the tissues of the growth including the cavity revealed a carcinoma of the lung, secondary to tuberculosis of the lung. Dr Gharpure, Professor of Pathology, G M College, demonstrated tubercles in some of these sections. Besides the cavity in the lung, there was air in the pericardial cavity and extra pericardial structures. Patient died due to circulatory failure resulting from intra- and extra-pericardial tamponnade.

It is a matter of conjecture as to how the air entered the pericardial cavity in this case. The most reasonable explanation I could offer is that during the process of separation of the parietal pleura from the thoracic cage, some of the lymphatic spaces of the

intrapulmonary tissues must have been torn open accompanied by a tear in lung tissue which let out the air. Transference of air took place through lymphatic spaces which run along the bronchi into the lymphatic channels at the lung root, which through intercommunications with the lymphatics of pericardium conveyed the air to the pericardial lymphatics. These might burst into the pericardial cavity due to the excessive tension.

Extra pericardial tamponade caused by air, exerts pressure to obstruct the venous return to the heart. Except in this case, the pericardial cavity itself remains unaffected usually in mediastinal emphysema but the great veins in their extra pericardial course, are subjected to direct pressure. The pressure is first felt on the pulmonary veins which results in congestion of the lungs and a diminution of the blood flow to the left auricle. At a later stage, as the tension of air increases in the mediastinum, it exerts a pressure on the caval veins which in turn lessens the inflow of blood into the right auricle, thus contributing to circulatory failure.

Dyspnoea and cyanosis, enlargement of veins in the neck and difficulty in swallowing are noteworthy features of mediastinal emphysema.

### HAEMOTHORAX

Haemothorax is one of the most common and important complications associated with chest injuries. Alarming though it is, there is very little danger from this condition unless the haemothorax is of a progressive type or it gets infected. It may be small from slight contusion or massive from severe crushing injuries involving lungs, vessels, etc. The haemothorax may come from different sources namely, intercostal and internal mammary vessels, pulmonary and other vessels or from the lung tissue itself, or from the torn diaphragm, liver, spleen, etc. Very rarely bleeding may come from the azygos vessels. Haemorrhage from a large vessel is instantaneously fatal. Bleeding from the lung parenchyma occurs slowly and gradually lessens as the lung becomes compressed. Superficial tear of the lung is associated with haemothorax, which may hardly amount to a few ounces. To compress the whole lung a much larger amount of blood is required. Bleeding from the arteries does not stop very easily and eventually results in a decreased blood volume in the circulation and increased intrapleural pressure, giving rise to circulatory and respiratory disturbances. The cardiac output becomes smaller and smaller resulting in peripheral circulatory failure. It is clear that a large haemothorax produces a progressive collapse of the lung, diminishes the vital capacity, offers increased resistance to pulmonary circulation and exerts a pressure upon the heart and the great veins, all of which, put together, results in death if it is not relieved. It is noted that wounds of the upper part of the lungs bleed longer than those at the base of the lung, which are controlled by the pressure of the fluid. Spontaneous arrest of this bleeding occurs only when the intrapleural pressure equals the pulmonary pressure if the bleeding is from the lung. The quantity of blood in the pleural cavity rarely amounts to more than 50 to 60 ounces. It is interesting to note that no clotting takes place in this effused blood, even if it remains for a week.

or longer. There are various views put forward to explain this phenomenon but most people are agreed that the blood is defibrinated by the churning action of the lungs. A clot is rapidly formed if infection supervenes. A perfectly aseptic haemothorax is eventually absorbed without adhesions unless a clot is formed. One has to decide in a case of haemothorax whether there is an active haemorrhage still going on or whether it has been arrested spontaneously.

Often there is very little haemorrhage from the external penetrating wounds of the chest-wall, unless by chance the lung is adherent to the chest-wall. Otherwise the blood collects in the pleural cavity which acts as a great receptacle. The wound of the chest-wall is usually oblique in its course and this fact prevents the easy escape of blood from the pleural cavity.

### INFECTIONS OCCURRING IN HAEMOTHORAX

Infection in an existing haemothorax is another great problem which confronts thoracic surgeons. In civil life infection in the existing haemothorax is not of very frequent occurrence. Its incidence in the penetrating wounds is greater than in non-penetrating wounds. In my series of 257 cases caused by sharp instruments, only 10 patients developed infection. A number of eminent surgeons during the last world war have published the incidence of infections following penetrating injuries—Heuer 20%, Elliot 37%, Shipley 40%, Livingstone 30%. Dirt, debris, fragments, clothing and other materials carried into and retained in the pleura at the time of injury favour infections. Anaerobic organisms, streptococci, pneumococci, and staphylococci are the usual organisms. The gas organisms if present, will produce gas in the pleural cavity and this may result in a tension pneumothorax. It is easy to make a diagnosis of infected haemothorax. Aspiration of the fluid and examination of the same by odour, smear and culture will certainly establish the nature of the infection.

### MASSIVE COLLAPSE OF THE LUNG

Massive pulmonary collapse may occur in a very severe contusion of the lung or other associated injuries of the thorax. The examination of the patient often reveals dullness on percussion with loss of breath sounds and absence of vocal fremitus and vocal resonance, all signs taken together strongly suggest the presence of fluid. X-ray of such a chest shows increased density of lung shadow and a high diaphragm moving on respiration but no sign of fluid. Aspiration brings also no fluid. Such a condition is due to massive collapse of the lung on the same side. This has been recognized to occur in trivial injuries of the thorax. Homo-lateral massive collapse may be found in cases of haemothorax even of a slight degree and the degree of

collapse in the lung may be quite out of proportion to the degree of haemothorax. This phenomenon of massive collapse may be explained on the basis that multiple small areas of atelectasis occur in the chest injuries which all put together are responsible for the occurrence of massive collapse. This is much more common than is thought of and is produced as a result of immobility and retraction of the chest-wall and diaphragm. By some, it is believed to be produced by bronchial spasm or obstruction. Pneumothorax, haemothorax or haemorrhagic infiltration of the lung do contribute to the production of massive collapse of the lung. A similar condition may occur at the base of the contralateral lung and may be mistaken for pneumonic consolidation. There is no pain, fever or subjective symptoms of severe illness. Abnormal physical signs disappear within a week. If massive collapse is produced on both sides at the same time, it will considerably diminish the vital capacity and upset the respiratory functions.

### CLINICAL FEATURES

Clinical manifestations of injuries of the lungs and pleura vary with the type and extent of the damage to these organs. The clinical picture presented by the patient in the early stages is that of shock. In severe forms of injuries, shock is of an alarming character and follows immediately on the injury. Shock is minimal or absent in cases of wounds restricted to the thoracic wall or wounds of a closed type in which the pleural cavity may have been opened, but there has been no damage to the viscera. Shock may be also present in cases of injury to intercostal nerves even in the absence of visceral damage. Besides this, the effects of pneumothorax and haemothorax will also accentuate shock.

Massive internal haemorrhage occurring from large vessels of the lung root or of the mediastinum is recognized by the very serious condition of the patient from the moment of injury. The symptoms and signs of shock, though present, do not mask the clinical syndrome of the massive internal haemorrhage, in which pallor, restlessness, failing volume of pulse, air hunger and signs and symptoms of failing circulation are predominantly present. There is a small group of patients in whom symptoms and signs indicating the serious visceral damage are delayed due to the fact that shock dominates the picture in early stages. Pneumothorax, if present in association with haemorrhage, adds to the respiratory distress causing cyanosis and dyspnoea.

In a number of cases, on admission to the hospital, a slow pulse has been observed which in the course of time changes to a very rapid, irregular and low volume pulse. The slow pulse may be due to local irritation of the vago sympathetic nerves. This often misleads one to think that no serious trouble has set in.

The outstanding features of pneumothorax, tension pneumothorax, open pneumothorax, haemothorax, emphysema and massive collapse of the lung have already been considered under their respective headings. The presence of tension pneumothorax is recognized by increasing dyspnoea, cyanosis, immobile chest on the affected side, bulging of intercostal spaces and a characteristic respiration—inspiration being of slow and shallow type, expiration slow and grunting type. Cough and haemoptysis are invariably present and dyspnoea may be intense.

Haemoptysis if present, indicates a wound of the lung. It may be a delayed symptom if the wound is in the peripheral part of the lung, but it may occur soon if the tear of the lung involves the bronchus. Absence of haemoptysis does not exclude the possibility of a wound of the lung. As is often the case, the edges of the wound in the lung may come together by the collapse of the lung as a result of haemothorax. Therefore the absence of haemoptysis should not be considered as a cent per cent proof of the absence of damage to the lung tissue, and especially it should not be taken as evidence against the possibility of a large collection of blood in the pleural space. The usual signs and symptoms of pleural effusion are present and aspiration will clinch the diagnosis of haemothorax.

Diagnosis of mediastinal emphysema after it has presented in the neck is easy as this is characterized by noticeable swelling of the neck and a crepitant feeling of the cervical tissues, and by hearing a gurgling sound on auscultation or by the total or partial disappearance of the area of normal cardiac dullness.

There may be protrusion of some of the abdominal organs in cases of thoracic penetrating and non-penetrating types of injuries in which there is a severe laceration of the diaphragm. There will be very few symptoms created by herniation and sometimes no symptoms are produced. The existence of diaphragmatic hernia may not be known till its presence is recognized by chance during X-ray examination performed for some other lesions in the chest. It is rarely found that sometimes the omentum presents in the lower thoracic wound when there will be no difficulty in diagnosis. The diagnosis can easily be made during exploratory thoracotomy.

The value of examination of the contralateral lung for possible development of signs and symptoms indicating pneumothorax, haemothorax and massive collapse of the lung should be fully realized and the presence of contre-coup injury should be constantly borne in mind.

The possibility of abdominal lesions in thoracic wounds should always be remembered and a thorough examination of the patient made to ascertain the damage to abdominal viscera. Free fluid in the peritoneal cavity, particularly in the flanks following injury suggests internal haemorrhage. If

a rupture of a hollow viscus takes place, there will be disappearance of liver dullness and presence of free gas in the abdomen. There will be increased resistance and rigidity of the abdominal wall associated with pain and tenderness. If these symptoms are persistent and bilateral, it indicates an abdominal injury below the diaphragm. It should be realized that rigidity in the abdomen does occur in thoracic visceral lesions due to injury or reflex irritation of the intercostal nerves, but this rigidity is unilateral and is of an intermittent type.

Horner's syndrome due to division of the sympathetic trunk may occur especially in cases of bullet wounds of the spinal cord.

After the patient has passed through the stage of shock, he generally feels better even though he may have a large haemothorax. Patients usually get a temperature on the first day which may be continuous and ranging from 100° to 102°. It becomes normal gradually in about 5 or 6 days' time. If infection supervenes, there will be signs and symptoms of fluid plus the signs and symptoms of septic absorption. Temperature and pulse rise again on the 4th or 5th day. The temperature is of a hectic type. Dyspnoea becomes more marked and the patient complains of pain in the chest and looks very ill. Aspiration of fluid from the pleural cavity will establish the diagnosis of infection by the naked eye appearance of the fluid, by its smell, smear and cultural examination. If there is contamination by anaerobic organisms fulminating infection of the pleural cavity develops. This may end fatally.

In an uncomplicated case it is 2-3 weeks before the patient recovers.

Another complication that may set in following an injury to the lung is pneumonema. This may be found on the opposite side.

If any dirty foreign body is retained in the lung in the area of laceration, gangrene or abscess of the lung may result. An abscess of the lung near the surface may burst into the pleural cavity and cause an empyema. If the perforation occurs in a localized space of the pleural cavity, the course of the empyema will not be too long and serious. But if the perforation takes place in the virgin pleural cavity and particularly if gas organisms are present, the course of empyema will be short and serious and usually ends fatally.

Following lung injuries bronchiectasis and cough are of very frequent occurrence. In some of my patients they have been persistent since the time of injury till now.

### DIAGNOSIS

If the above salient features of injuries involving the lungs and pleura are well remembered, there will be no difficulty in arriving at a diagnosis as

to whether the lung is involved or not. The presence of haemothorax does not necessarily mean the presence of an injury to the lung as often the source of haemorrhage may be from other sites. If immediately following the injury there has been an absence of shock with a good and strong pulse followed by a rapid, low volume pulse, particularly if associated with dyspnoea, it means internal haemorrhage. Pallor, an hunger, marked dyspnoea, fast and weak pulse and an increasing fluid level in the thorax following an injury are absolutely indicative of progressive internal haemorrhage.

The presence of air in the pleura is determined by the resonance it produces on percussion and by the absence of lung sounds. The presence of tension pneumothorax is evident by the bulging of the intercostal spaces and the deviation of the heart and cervical trachea to the opposite side. Cyanosis and dyspnoea are marked features of tension pneumothorax.

There will be no difficulty in arriving at a diagnosis in the case of emphysema, because of its crepitant feel on palpation.

X-ray of the chest is of inestimable value in confirming the diagnosis not only of extensive complications of intrathoracic injuries such as pneumothorax, presence of fluid in the pleural cavity and protruded abdominal viscera, etc., but it also demonstrates the presence and location of foreign bodies. On no account should the wound be probed, to find out whether there is a communication with the pleura or not.

The presence of haemoptysis indicates an injury to the lung but its absence does not exclude the possibility of lung injury.

Infection of the pleura with or without haemothorax can be recognized by high hectic temperature, fast pulse, and pain in the chest. Cough is a distressing symptom in cases of pleural infection. High and increasing leucocytosis is strongly suggestive of infection occurring in the pleural cavity or in the lung. Aspiration of the fluid will determine the diagnosis.

The possibility of abdominal injuries should not be lost sight of while considering a diagnosis of thoracic injuries. The signs and symptoms of peritoneal irritation, evidences of free fluid in the peritoneum, pain and rigidity of the abdomen, and omentum protruding through the wound in the chest are some of the features which indicate injury to abdominal viscera. The obliteration of liver dullness and demonstration of air between the liver and the diaphragm by X-ray is highly suggestive of injury of a hollow viscus. Haematuria suggests an injury to the kidney.

Possibilities of multiple injuries should be remembered as it has often happened that death has followed even after the repair of the most obvious injury. It is essential that soon after the shock is over, a thorough examination be again made to ascertain the type and extent of injuries.

The nature and type of injury resulting from a bullet can be determined by the site of entry and exit though it is not possible to estimate its actual extent. A wound in the precordium is likely to involve the heart and the pericardium, while a wound in the lower part of the chest is likely to penetrate into the lung, diaphragm or the liver.

#### TREATMENT OF WOUNDS OF "LUNGS AND PLEURA"

The main principles of treatment are aimed at prevention and relief of (1) shock, (2) haemorrhage, (3) asphyxia and (4) sepsis. It is certainly true that in chest injury cases, there are occasions when a surgeon can never be in time to do anything for the patient to prevent a fatal termination, as for example, when one of the main blood vessels has been injured and haemorrhage has been severe. On the other hand, it is his duty to transport a patient immediately to an institution where all modern facilities are available to deal with the complications as they arise. If operative interference is needed, it will always be urgent and the surgeon will have done a great deal for the patient by placing him in an institution before he gets moribund.

In a hospital the development of symptoms can be more accurately observed. Except in cases of grave injuries to the chest wall and subjacent viscera where there is immediate difficulty in breathing and a possibility of severe haemorrhage, the wisest course will be to wait and observe the patient carefully. The anxiety of the patient and the shock he is suffering from will have to be dealt with.

#### TREATMENT OF SHOCK

Shock is usually the first and most important condition in chest injuries which demands an immediate attention. The presence of a certain degree of shock is beneficial because it helps to arrest haemorrhage. Though it is a compensatory mechanism, it is unwise to allow the patient to remain in a condition of shock for a prolonged period. Cough and respiratory distress add much to the anxiety, and help in the exhaustion of the patient. The primary aim in the treatment of chest injuries is always directed to the treatment of shock. Morphine, gr  $\frac{1}{4}$  in repeated doses should be given to allay pain, respiratory distress, restlessness and anxiety. If prompt effect of the drug is required, it should be given intravenously. The administration of continuous oxygen has been found of inestimable value. It relieves dyspnoea and cyanosis and reduces the respiratory distress. The body temperature should be preserved. The patient should be placed in such a position as to give him maximum comfort and free respiratory movement. Most people prefer to put the patient in a semi-sitting or propped up position supported on a back-rest. Immobilization of the chest-wall by a single strip of adhesive plaster which is applied round the lower part of the chest may be secured in

cases in which associated rib fractures or other painful chest conditions are present. This will considerably relieve pain. The judicious administration of blood plasma will have to be seriously considered to restore the circulatory blood volume. The bleeding from the wound in the chest-wall should be arrested and if there is an open pneumothorax the wound should be immediately closed by a pad temporarily or by a suture. This will produce considerable relief in respiratory distress and help in minimising the shock.

After the shock is overcome, further attention to the wound if any in the thoracic wall, is given. A wound in the thoracic wall should be disinfected with great care and debridement carried out. In suitable cases where there is no haemothorax or a small haemothorax suggesting absence of gross intra-thoracic injuries an "open wound" should be converted into a "closed wound" by applying sutures to the muscles and the skin in the usual way.

### TREATMENT OF "CLOSED WOUNDS"

Treatment of wounds of the closed variety consists in daily follow-up of the patient. The patient is kept as quiet as possible in an isolated place, no visitors being allowed. Morphia is generally given and the patient is observed carefully from hour to hour.

The pulse is to be carefully noted. Temperature in the first 4 or 5 days upto 100° or even more is of not much consequence, but if it rises to 103° or even more, accompanied with shivering, infection should be suspected. The respiration which is shallow and rapid at first, becomes quiet and then becomes rapid again if there is pneumo- or haemothorax. The appearance of the patient is to be noted. Pallor reappears if haemorrhage increases. Cyanosis and dyspnoea may present themselves when the action of the heart has been impeded by the menacing complications.

Examination by percussion and auscultation will reveal the presence of effusion in the chest and also whether it is stationary, increasing or subsiding. X-ray examination of the chest in such cases will be of immense value. It is to be remembered that these examinations will be made with as little disturbance as possible to the patient. The patient will be helped by a trained nurse in all his movements. She will support his neck by slipping her hand behind his neck for auscultation without in any way disturbing the patient.

The subsequent course of the patient depends upon the presence or absence of complicating factors such as haemothorax, infection in haemothorax, tension pneumothorax and emphysema. All these require treatment.

#### *Treatment of Haemothorax—*

There are three main methods of dealing with the haemothorax as suggested by various workers. One method aims at treating haemothorax on

conservative lines hoping that blood may get absorbed in the course of time without causing much trouble. The second method consists in aspiration of the haemothorax and replacement by air. The third method aims at the removing of blood from the pleural cavity and at dealing with conditions found inside the thorax by doing an operation. Others advocate simple aspiration of blood and some believe that aspiration and wash-out with normal saline is ideal. Closed stab drainage is also advocated.

Chandler has recently simplified the management of haemothorax by classifying into three groups (1) simple and non-infected, (2) infected and (3) complicated haemothorax.

#### *Simple Haemothorax—*

If there is a small quantity of blood in the pleural cavity, no special treatment is necessary, except to wait and watch daily the course and progress of the case. A large haemothorax may require aspiration only when, according to some, pressure symptoms are present. It is believed that collected blood in the pleural cavity acts as a tamponade on the bleeding lung and arrests haemorrhage. Others regard that blood provides an excellent culture medium for organisms to grow. Besides infection, haemothorax takes a very long time for absorption and thus favours adhesions in the pleural cavity. It is on this belief that aspiration of the haemothorax and replacement by air as a compressing agent on the injured lung became a popular remedy with many workers. This method of aspiration and gas replacement has been extensively practised by eminent English surgeons during the present conflict.

Opposed to this, during the last world war, Col Yates advocated an open operation for large haemothorax. He pleaded —“Air is a serous membrane irritant and elimination of irritant is a basic principle in the prevention as well as in the treatment of pleuritis. Positive intra-pleural pressure, high enough to stop haemorrhage by pulmonary compression, compresses the homolateral lung, produces contralateral emphysema and interferes with pulmonary circulation. Compressed lung means contracted lung, which is often difficult or impossible of re-inflation. If re-inflation occurs, a universal adhesive pleuritis is certain.”

The method of aspiration and gas replacement in the management of closed haemothorax did not gain much ground till recently when many authors published the satisfactory results based on this line of treatment. The advantages of keeping the pleura free from blood and exudate are many. The risk of infection and possibility of pleural adhesions are much less. The disadvantages are that (1) an early aspiration exhausts the patient who is already shocked. This may be met with by starting aspiration after 2 days,

(2) clot may block the needle and make aspiration difficult, (3) re-occurrence of bleeding due to re-expansion of the collapsed lung. The last disadvantage may be met with by gas replacement which may keep the lung in a collapsed condition.

Aspiration and gas replacement is the method indicated in all the cases in which within a few days of injury a large haemothorax is found. Gas replacement may be dispensed with in cases in which there is no haemoptysis indicating possible absence of injury to the lung. Evidence of infections in pleural cavity also contra-indicates this procedure. In such cases simple aspirations will have to be resorted to. Injury to the lung is shown by varying degrees of haemoptysis and if haemoptysis is present, aspiration should invariably be accompanied by gas replacement. The simple aspiration is carried out in later stages of such injuries of the chest when the haemoptysis has stopped indicating that the lung wound is closed and healed and the lung is ready to expand.

Haemoptysis if it occurs repeatedly in the absence of haemothorax or in the presence of a small haemothorax, can be controlled by artificial pneumothorax, repeated till the haemoptysis stops.

If the effusion in the chest increases within a few days after injury and if there is respiratory distress, exploratory puncture and evacuation of the contents will have to be seriously considered. The aspirated fluid should be examined from all aspects. Many times such a fluid though it looks like pure blood to the naked eye, is blood diluted with a large amount of serum. This is determined by a red blood corpuscle count. The serous fluid is due to the irritation of the pleura by the effused blood. If the effusion consists of pure blood, the indication is for an immediate operation to arrest bleeding. If the aspirated fluid contains more of serum, it shows that the haemorrhage has stopped and the serous fluid is increasing. Evacuation of the fluid by the needle is the only treatment indicated and no gas replacement will be necessary. If the evacuated fluid is abundant and shows only few red blood corpuscles, it also indicates that the chances of its filling up again are great. Aspiration and air replacement should be done in such cases.

There are certain points about aspiration and gas replacement which I would like to emphasize. The patient at the time of aspiration sits propped up in a rather upright Fowler's position exposing the side for aspiration. Aspiration should start after shock is over—i.e. after 2 days. The needle should be inserted in the 5th intercostal space in the mid-axillary line avoiding the narrow part of the chest, namely, the costo-phrenic sinus. The needle should be of a fairly wide bore to prevent blockage and not more than 2 inches in length. A trocar and canula of the size used for insertion of intercostal catheters may be advantageously used instead of a needle. During

the process of aspiration the intrapleural pressure should not be allowed to diminish too much otherwise injured lung may expand. This may either result in the opening out of a broncho-pleural fistula or a lung wound causing fresh haemorrhage. Measurement of intrapleural pressure and gas replacement are provided by an artificial pneumothorax apparatus. 500 to 800 c.c. of blood is slowly aspirated and repeated in 2 or 3 days' time till the X-ray of the chest is clear.

Preparations having been made for aspiration as suggested above, a second needle is introduced higher up above the level of the fluid for measuring the intrapleural pressure. As the fluid is withdrawn through the lower needle, air is admitted at such a rate that pressure in the pleural cavity is kept at a desired level. This pressure ought to be kept at a level which will keep the lung in a collapsed condition and will be between 0 and -4.

In the absence of a pneumothorax apparatus gas replacement can be done through the aspirating needle which lies within the fluid level. The air will be injected through this with a large syringe, the intrapleural pressure being noted by inserting another needle above the level of the fluid and connecting it to a water-manometer.

Cloetta suggested an interruption of the phrenic nerve for creating a diaphragmatic paralysis. This is done by injecting 1% novocain into the phrenic nerve. This will produce paralysis of the diaphragm which will last for 4 to 5 days. The lung rest thus produced, will be partial and temporary. This method will be more suitable in a case of bleeding from the base of the lung. Cloetta in his method includes the closure of the chest wound in addition to phrenic interruption. I believe, that crushing of the phrenic nerve and injection of alcohol into it, will produce more lasting and effective paralysis, than Cloetta's method of simple injection into the nerve. Besides this, the scope of Cloetta's method is limited, as it will be suitable only in cases of small haemothorax and of bleeding from the base. Besides, it will take a long time for a large haemothorax to get absorbed and there will be every possibility of infection supervening. Thickened pleura, adhesive pleuritis and resulting deformity of the chest are additional factors which should contraindicate the procedure as suggested by Cloetta.

Few observers, at the present day, agree to the method of surgical intervention for large haemothorax in a closed chest wound, the majority follows the procedure of "Watchful waiting." Lately I have been trying an aspiration and air replacement with encouraging results.

#### *Infected Haemothorax—*

Infection may follow haemothorax and one has to be on the watch for this complication every day. This may occur even after 2 or 3 weeks. A rise

in temperature, fast pulse, pain in the chest, presence of fluid and a cough will put the clinician on guard. It will be his duty to recognize the onset of infection at an early date and to treat it at once. An exploratory puncture in doubtful cases should always be done. Aspirated fluid should be examined from all its aspects, viz, smell, colour, consistency, smear and culture. Once the cellular content and the fluid are increased it should be treated on lines generally used for empyema, i.e., repeated aspirations, closed intercostal drainage and if necessary, rib resection and drainage. The administration of the sulfonamide group of drugs is more useful in the prevention than in the treatment of established cases of empyema.

### *Complicated Haemothorax—*

This variety of haemothorax can be treated by an aspiration and gas-replacement provided the injury does not involve other structures, such as blood vessels, diaphragm, liver, etc. In the presence of gross severe injury to any of the intrathoracic structures, it will be the wisest course to do an exploratory thoracotomy. The progressive bleeding certainly demands immediate surgical intervention, as aspiration will make room for more bleeding to occur. Further details regarding the operation etc. will be given below.

### *Tension Pneumothorax—*

Certain of the patients while under observation develop a tension pneumothorax which results from a broncho-pleural fistula of the valvular type. This condition is not so uncommon and requires immediate surgical attention. Relief may be obtained by introducing a needle into the pleura which brings the intrapleural pressure to atmospheric pressure and gives considerable relief to the patient.

After withdrawing the air, the needle may be taken out and the patient is watched carefully for the recurrence of the condition. If it recurs rapidly a suitable needle is inserted preferably in the 2nd intercostal space 3" away from the sternum and is connected to a rubber tube attached to the simple under water drainage bottle as used for closed drainage of empyema. Occasionally when a patient coughs intrapleural pressure becomes less negative for a short time and opens out the wound in the lung as it tries to re-expand. Preferably a needle is kept in the chest so that the pressure never goes below the atmospheric pressure and the lung is allowed to remain in a collapsed condition till such time as the broncho-pleural fistula is healed.

### *Mediastinal Emphysema—*

Subcutaneous emphysema hardly requires treatment. An operation for massive mediastinal emphysema could hardly be required if the treatment

outlined for closed wounds is followed, in the way already described. But exceptionally there may be some occasions where a deep collar incision in the jugulum (Burn's space) will relieve the pressure on the mediastinal structures. On very rare occasions further surgical intervention for suturing trachea or bronchus may have to be undertaken. If the opening of the bronchus is large, and the escape of air in the mediastinum is rapid, death usually occurs quickly, therefore prompt measures are necessary.

#### *Massive Collapse of the Lung—*

Massive collapse of the lung requires no special treatment except to roll the patient on the sound side and induce him to cough so that the obstructive clots and plugs of mucus may be dislodged and coughed out. If the patient is unable to cough due to pain or exhaustion or other conditions following trauma, postural drainage may be employed. Failing this, the trachea and bronchi may be cleared out of clots and mucus either by intratracheal aspiration or bronchoscopy.

#### TREATMENT OF OPEN PENETRATING WOUNDS

Open penetrating wounds may be restricted to the thoracic wall only or may also involve the interior of the thorax. In the latter case they are termed "Sucking wounds." The size of the opening may vary considerably. In civil practice the proportion of penetrating wounds limited to the thoracic wall is greater than in military practice. 158 cases out of 257 were limited to the thoracic wall in the series of cases recorded by me against 99 cases involving the interior and the wall of the thorax. The records of the chest wounds occurring in the last world war published from some hospitals show that the majority of these wounds had penetrated into the thorax, only 10 per cent being limited to the thoracic wall.

#### FIRST AID MEASURES OF "SUCKING WOUNDS"

"Sucking wounds" producing open pneumothorax are extremely harmful and they require immediate attention. Certain emergency measures like covering the wound with a pad and fixing it by adhesive plaster, or a provisional dressing by air tight oiled silk, kept in place by elastoplast may temporarily close the open wounds as a first aid measure. In the last as well as in the present conflict soldiers are provided with different sorts of contrivances which may temporarily close such open wounds.

#### THE TREATMENT OF A SIMPLE "OPEN WOUND"

Once the patient is in a general or a base hospital, immediate attention is paid to the wound in the chest soon after he recovers from shock. His

general condition is noted and the patient is carefully examined, keeping in mind all the complicated factors which may follow these injuries. In the absence of any gross visceral injury or retained foreign body, cleaning of the wound is all that is required. The wound is cleaned, debridement is carried out and the wound is closed. Now it should be treated as a "closed wound" as previously described. Some advise packing, but I do not like this, as, very often, the pack is displaced by the movements of the patient. If no visceral damage is suspected, this is all that is required with the addition of intercostal closed water seal drainage of the pleural cavity for at least 48 hours to 72 hours. Drainage is particularly to be instituted if the pleura has not been cleared of blood clots and serous exudate. The blood and serum in the pleura act as a culture medium for organisms to grow. After removal of the drainage tube, a careful watch will have to be kept for reaccumulation of fluid, and, if it occurs, it will need drainage again. If infection occurs and becomes established, the case is to be treated on the general lines of an empyema in the chest. Besides draining the pleural cavity for 2 or 3 days, it is my practice to sprinkle the pleura with sulfonamide powder (2 tablets) and rub the same into the external wound before it is closed. In addition the patient gets 8 tablets a day by mouth for 3 consecutive days. The incidence of infection in lung and pleura has been considerably minimised after the use of this drug.

### TREATMENT OF COMPLICATED "OPEN WOUNDS"

Complicated open wounds are those associated with severe intrathoracic visceral damage, they carry with them septic contamination resulting from dirty clothing, fragments, rib, shell fragments, or other foreign bodies which at the time of injury have been swept in and have been retained inside the thorax. There has also, probably, been a very large amount of haemorrhage, and active bleeding may be still going on. The serious effects of open pneumothorax on the cardio-respiratory system will produce cyanosis, dyspnoea and shock indicating failure of circulation and respiration. Serious wounds caused by stabs not only involve the parietes but may also involve the lungs, diaphragm, liver, superior vena cava, inferior vena cava, auricles, ventricles and other thoraco-abdominal organs. Recently one of my colleagues had come across two cases, of an incised wound of the right auricle extending into the superior vena cava and the other of a wound of the innominate vein extending into the internal jugular vein. In both the cases there was profuse haemorrhage. The former case died after two days after operation, the latter made an uneventful recovery. I had a similar case of a stab in the lung cutting the inferior lobe of the right lung, tearing the diaphragm and making a small nick in the inferior vena cava. Considering the seriousness of damage to the various intrathoracic and abdominal organs

in the open sucking wounds of the chest, I have followed a definite plan for taking the patient to the theatre and doing a perfect job of exploring the thoracic cavity. This consists in sterilisation and debridement of the superficial wounds, extension of the incision preferably in the same intercostal space, examination of the viscera for tears, bleeding points and retained foreign bodies. This also includes debridement of lung wounds, removal of foreign bodies and suturing or dealing with tears in the viscera, control of haemorrhage by sutures and subsequent closure of the parietal wounds leaving a drainage tube in the pleural cavity. Any involvement of the abdominal viscera including the diaphragm, liver, stomach, kidney, spleen, etc., should be looked for as they may require attention. This is an essential step for a successful operation because many times it has happened that a tear in the liver or diaphragm or in the lung or other structures has been overlooked with fatal results.

Exploratory thoracotomy after the shock is over is a safe procedure and can be carried out with a very small mortality. Open pneumothorax created by the surgeon is practically free from ill-effects provided the mediastinum is steadied. Besides this, the success of an operation depends on the rapidity and gentleness with which it is carried out. "Quickly in and quickly out" is the principle which the thoracic surgeon should observe. Slow surgery entails a lot of time and becomes bad surgery in the thoracic region so far as the results are concerned. Arrangements should always be at hand for giving transfusion of blood or plasma or glucose. If this arrangement cannot be made, injections of his own blood collected from the pleural cavity can safely be given during operation without considering any question of subsequent infection. The auto-transfusion in the absence of other facilities will certainly be a life-saving measure.

Gross injuries of the pulmonary tissue with an extensive wound on the thoracic wall will demand an exploratory thoracotomy. Progressive bleeding is a strong indication for operation. In cases where there is herniation of the lung through the wound, it may require an exploration for cleansing and reposition of the organ. Evidence of retained foreign bodies like debris, shell fragments, shrapnel will form another indication for urgent removal. These foreign bodies, if septic, as they usually are, cause later, a fulminating infection in the pleural cavity or chronic pulmonary suppuration leading to chronic gangrene, bronchiectasis, abscess and empyema. For doing all these operations, the services of a specialist thoracic surgeon would be desirable and in his absence it will be wiser to confine oneself to surgical intervention of minimum necessity and not to undertake extensive operations.

The site of incision varies with the circumstances of the case. It is always desirable to make a new incision for exploratory purposes. It should

be away from the traumatised tissues. If the haemorrhage is suspected to be coming from the internal mammary or intercostal artery, the chest may be entered by enlarging the original wound. For a wound situated in the lower part of the thorax, lower thoracotomy may be performed. For a wound situated in the upper part of the thorax there are two ways of approach, one is the anterior approach known as "Antero-lateral thoracotomy" and the other is the posterior approach known as "Posterolateral upper thoracotomy."

### TECHNIQUE OF LOWER THORACOTOMY

An incision about 7 to 8 inches in length is made along the 7th intercostal space dividing all the structures till the parietal pleura is approached. All bleeding vessels are ligatured, and the edges of the wound are covered over by towels which are secured with clips. The parietal pleura is picked up and incised. A self-retaining intercostal retractor is then inserted and when opened up gives an excellent exposure of the lung and other adjoining parts.

After dealing with the conditions found and after carrying out a toilet of the pleural cavity, the intercostal wound is closed. This is done by passing four or five pericostal sutures of No. 4, catgut or medium strength silk. Prior to this, a long pack is placed along the whole length of incision in order to avoid injury to the underlying lung. This is left in place till the time of tying of the pericostal sutures. The posture of the patient is changed so as to bring the ribs nearer. The series of sutures is then tied tightly during expiration. Outer sutures are tied first and the centre ones last.

### ANTERO-LATERAL APPROACH

A curved incision begins two inches from the inner end of the clavicle and parallel to it, then it curves down on the inner side, over the 2nd, 3rd and 4th costal cartilages near the sternum. The incision is deepened through the deep fascia which exposes the pectoralis major muscle. The incision is carried through the attachment of the sternocostal and clavicular portions of this muscle to form a musculo-cutaneous flap. This procedure exposes 2nd and 3rd and 4th ribs and their costal cartilages. The anterior portions of the 2nd, 3rd and 4th ribs are now excised. The extent of the excision varies with the amount of exposure needed. If more working space is necessary, the cartilages may be excised. The pleura is held up with forceps and incised vertically. A clavicle in some cases requires to be disarticulated in order to have a proper exposure. After the necessary intra-thoracic manipulations, the wound is closed in the usual way. The lung is retracted outwards by the lung retractor to expose the great vessels in the superior mediastinum,

Instead of the standard anterior thoracotomy, a long intercostal incision in the 2nd or 3rd intercostal space in the anterior part of the thorax may well suffice for exposure of the lung.

The upper lobe may also be exposed by making an incision posteriorly in the same fashion as in paravertebral thoracoplasty and subsequently dividing the scapulo-vertebral muscles and retracting the scapula forwards. Incision is now made in the 3rd or 4th intercostal space. The subsequent steps of the operation are just the same as in lower thoracotomy.

The approach to the lung root when one of the vessels in the root is bleeding is best secured by having a long incision in the 5th intercostal space carried forwards anteriorly over the sternum. Ligature of one of the pulmonary arteries or the vein can be done. This procedure does not result in gangrene of the lung, the circulation being carried on by the bronchial vessels.

Whatever approach one may select, the necessary debridement of lung tissue and toilet of the pleural cavity are essential steps in the operation prior to its closure. On opening the pleura, the blood usually gushes out. The wounded area of the lung is caught and held up by the lung forceps. The wound is cleaned and ragged tissues are excised. The larger vessels and bronchus, if torn, are ligatured. The lung wound is finally sutured with chromic catgut No. 2. The sutures should not be too tight and should not include too much of the lung tissue. Finally the pleural cavity is cleansed out with a swab and all blood-clots are removed. The wound is closed leaving a drainage tube in the pleural cavity. This may be removed after 72 hours.

The points which one will have to consider during operation are as follows —

If the lung tissue is too much torn or practically severed from its root or if there is an extensive laceration with laying open of the bronchi and pulmonary vessels, excision of the affected lobe or an immediate lobectomy will have to be seriously considered.

If there is a massive defect of the chest wall, the gap may be closed and open pneumothorax prevented by either of two methods. (1) packing with strips of gauze, the pack to be left inside for at least a week. An air-tight dressing is applied over it. In 8 or 10 days' time the pack is removed. Meanwhile the lung gets adherent to the margin of the chest-wall and the rest of the pleural cavity gets isolated. The cavity that is left after the removal of the pack, will be allowed to close in the usual way by the formation of granulation tissue. (2) By suturing the margin of the lung to the margin of the chest wound. The first method is the better.

In cases of herniation of the lung, the organ may be replaced after cleaning. If the protruded lung has become necrosed, the necrosed area may be excised and the cut edges sutured to the chest-wall.

In cases where there is haemorrhage from a torn liver, without any involvement of thoracic viscera, the liver may be sutured through the diaphragm. If such suture is not possible and the bleeding is profuse, the wound in the liver may be packed and the pack brought out through a separate incision. The diaphragm and the thoracic wound are closed in the usual way.

The after-care of patients who have undergone these operations is an extremely important problem which takes all the energies of the surgeon and the attending staff. The patient should be treated for post-operative shock on usual lines. As a rule morphia is administered in repeated large doses to make him comfortable and relieve pain and respiratory distress. Administration of continuous oxygen has been of extreme value. The patient should be rested in a half sitting position on a back-rest in such a way that the sound side can move freely. The nurse must be trained and should assist him to bring out the expectoration. Careful and close observations must be kept up for the possible development of broncho-pneumonia on the opposite side. This is not of very frequent occurrence. Precordial pain suggests cardiac distress and may follow the operations due to a sudden change in the mechanism of the thorax. Cardiac stimulants may be of value in cases of myocardial damage.

Sepsis may set in in the external wound of the chest. Similarly infection may occur in the pleural cavity or in the lung following operation. Suitable treatment should be at once adopted. The possibility of pleural infection is really very great. The importance of draining the pleural cavity and the value of microscopical and macroscopical examinations of the fluid have been sufficiently stressed.

Recurrence of bleeding may occur after the chest has been closed. The dressings may be soiled with blood. The bleeding may come from the chest-wall or from the lung and may require treatment.

Sutures of the lung may give way and may lay open the bronchi directly into the pleural cavity. This may lead to tension pneumothorax and if septic material is also being poured into the pleural cavity, it may lead to tension pneumothorax and empyema. Suitable treatment on lines previously indicated should be carried out.

In doubtful cases of tension pneumothorax and empyema or inflammatory conditions and other complications following the operations, radio-grams taken by portable X-ray will be of immense value. Besides this, a close watch is kept on the pulse respiration and temperature. This, in con-

junction with other clinical findings and blood examination will tell us early the nature of the complications. The value of chemotherapy has already been stressed.

### PROGNOSIS

The prognosis of these cases certainly depends upon the type and extent of the intrathoracic lesions. Prognosis is certainly grave if larger vessels are involved and vital organs like the heart has been penetrated or severe laceration of the lung has taken place. It becomes still more grave if severe injuries of the thoracic organs are associated with injuries of abdominal organs. Besides, multiple injuries and bilateral involvement, mean a very bad prognosis. Prognosis is far better in simple and uncomplicated cases but it becomes worse if infection supervenes. Infections add to the mortality.

Out of the 60 patients operated upon 4 died as a result of infection, 11 died due to shock and haemorrhage, 2 died due to suicidal bullet wounds after taking opium, 2 died due to injuries in the same organ or other organs not being recognised. Out of these 19 deaths, 9 were due to shock and haemorrhage resulting from multiple injuries to lung, diaphragm, liver, etc. Out of the remaining 10 deaths 1 died on the table, 4 were due to infections, 2 were due to opium poisoning and 3 were due to shock and haemorrhage. Total death rate following these operations either resulting from shock or haemorrhage was about 28 per cent. Deaths due to infection amounted to 7 per cent of cases while shock and haemorrhage following these operations carried away nearly 18 per cent of these cases.

In no case was blood transfusion done. Auto-transfusion of blood was possible only in two cases. The high mortality may be attributed to the want of proper after-care and facilities.

The statistics given in this article are not very accurate. In many cases proper notes were not found. Post-mortem examination was not done in every case, and this added to the difficulties in arriving at correct figures.

*(To be concluded)*

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# X-RAY DIAGNOSIS OF CHRONIC OTITIS MEDIA

BY

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In an article on X-Ray diagnosis of acute mastoiditis published in Vol V of this Journal I have explained, that the ordinary frontal, sagittal and transversal projections of the skull are not suitable for the examination of the temporal bone in diseases of the ear. We want to see the external acoustic meatus, the tympanic cavity, especially the attic, the antrum with the pneumatic system, the labyrinth and the inner acoustic meatus with its surroundings. None of the many projections devised so far is suitable for the depiction of all these organs at once. "Thus the Viennese school utilises three different projections, the projection of Schueller for the examination of the pneumatic system and the topography of the tegmen and the descending part of the transverse sinus, the projection of E. G. Mayer for the external acoustic meatus, the attic and the antrum and the projection of Stenvers for the labyrinth, the inner acoustic meatus and the tip of the pyramid." In cases of acute mastoiditis our interest is focussed on the pneumatic system and the topography of the dura mater and the sinus and thus the projection of Schueller will suffice for our purpose. It has been used in most countries of the world and it found an ardent supporter in England in Dixon who showed his collection of interesting cases at diverse Congresses. Some of these pictures have also been reproduced in the ordinary textbooks of ear diseases used at the English Universities. In cases of chronic otitis media the examination of the antrum, the aditus ad antrum, the attic and the external acoustic meatus is essential and thus the projection of E. G. Mayer will have to be added to that of Schueller the latter showing the topography of the antrum in relation to sinus and dura mater and the condition of the pneumatic cells, if any happen to be present.

The projection of E. G. Mayer is made as follows. The patient lies on his back, the head turned towards the diseased side at an angle of  $45^\circ$ . The film is closely attached to the auricle of the diseased ear in the upright position by the help of a small sandbag pushed in between examination table and film-container. The auricle is turned forwards, so that it covers the external acoustic meatus. The central projecting ray forms an angle of  $45^\circ$  with Reid's base line and leaves the skull by the external acoustic meatus of the side under examination. Thus the central projecting ray enters the skull at about

the point where the sagittal suture reaches the coronal suture, i.e., at the "bregma" of the anthropologists (Fig 1).

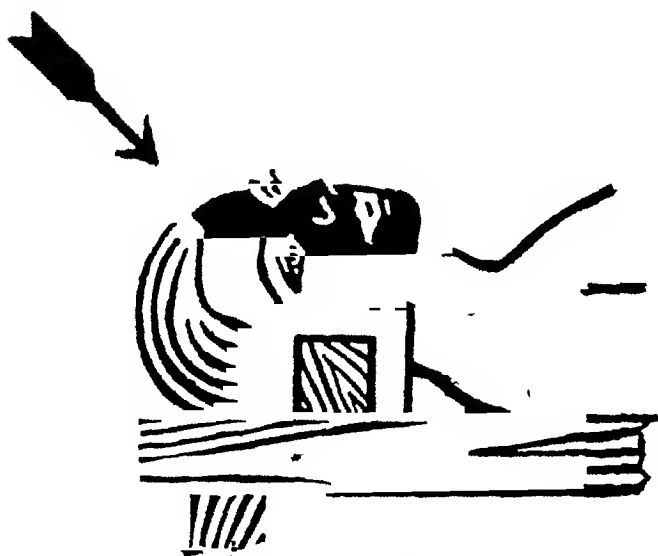


Fig 1 Posture of patient in E. G. Mayer's projection of right temporal bone. The arrow indicates the direction of the central projecting ray.

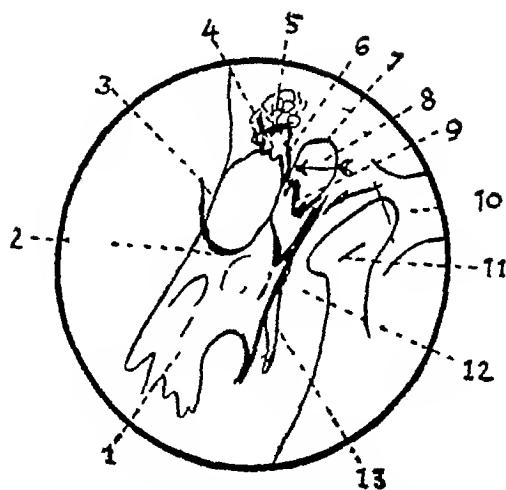


Fig 2 Diagram of E. G. Mayer's projection of a poorly pneumatized temporal bone —

- (1) tip of petrous bone
- (2) tip of mastoid process
- (3) posterior wall of petrous bone
- (4) antrum
- (5) periantral cells
- (6) aditus ad antrum
- (7) roof of attic
- (8) clear spot due to superposition of attic and external acoustic meatus
- (9) free border of tympanic bone
- (10) zygomatic process of temporal bone.
- (11) condyloid process of mandibula.
- (12) anterior wall of petrous bone
- (13) styloid process.

The arrow indicates the inner upper part of the posterior wall of the external acoustic meatus.

Fig 2 shows the diagram of E. G. Mayer's projection of the temporal bone. As the cases of chronic otitis media, for which this projection is used, concern mostly temporal bones with incomplete pneumatization, a picture has been selected, where the pneumatic system consists of a few periantral cells only. We start our analysis from the capitulum of the condyloid process of the mandible, which is clearly visible in the pictures, although it is slightly distorted by the obliqueness of the projection. The two converging lines on the right side of the diagram correspond to the root of the zygomatic process. The mandibular fossa is marked by a sharp bone line, which continues downwards into the anterior wall of the petrous bone. The pointed bone

bulging over this line is the styloid process. Parallel to this line a second line is visible which has been marked in the diagram by the point of an arrow. It is the posterior wall of the external acoustic meatus. Dorsal to it (*i.e.*, on the left side of the diagram) the antrum and the aditus ad antrum are visible. The antrum is surrounded by small periantral cells. The V-shaped shadow bordering the clear spot formed by the superposition of external acoustic meatus and attic is the free edge of the tympanic bone. The half circle shaped line forming the upper boundary of this clear space is the roof of the attic. Visible are also the tip of the mastoid bone and the posterior wall of the petrous bone.

Before entering into the description of the changes characterising chronic otitis media a few general remarks are essential. Every chronic otitis develops out of an acute one. But while in cases of extensive pneumatisation the acute otitis leads to mastoiditis and, if no spontaneous improvement or operation takes place, to the well known complications of meningitis, brain abscess and sinus thrombosis, the acute otitis in a non-pneumatised or poorly pneumatised temporal bone becomes chronic in due course without having developed fulminant acute symptoms. Therefore we encounter usually in cases of chronic otitis temporal bones without pneumatic cells or with only a few of them. These cases, in which the main symptoms to be discovered in the X-Ray pictures are the absence or rudimentary condition of the pneumatic system, form the first group of cases from the radiological point of view. In other cases—much rarer than the former ones—some, mostly irregular, pneumatic cells are present. These cases are of great importance as often after a long period of only minor symptoms suddenly severe complications may develop. They are often characterised by changes of the histological features of the mucosa, explained by some authors by metaplasia, by others by the immigration of the epithelium of the external acoustic meatus through spontaneous or operative perforations of the tympanic membrane. As long as these changes are confined to those characterising the desquamative otitis media, the X-Ray picture will not show any extraordinary features, but this changes when the desquamative otitis develops into a cholesteatoma which cases form the third group of typical X-Ray pictures in chronic otitis. Finally it may be mentioned, that any dormant case of otitis media can show acute symptoms, a condition, which shall be called in this paper “acute exacerbation.”

As for the technique to be used in cases of chronic otitis media, much has already been said before. We need Schueller's and Mayer's projection of the diseased side. But while in cases of acute mastoiditis the comparison between the Schueller projections of both sides was valuable for tracing changes of minor extent and intensity, a Schueller's projection of the normal

side is superfluous in cases of chronic otitis, as there the pneumatisation of both sides is usually too different to be compared

*Group 1*—In most cases of chronic otitis the X-Ray picture will reveal the complete absence of pneumatic cells. There is no doubt that in these cases the air has disappeared from the antrum, but due to the smallness of this cavity and its being surrounded by rather dense bone no differences in the opacity of the tympanic cavity will be traceable. In these cases it is essential to study carefully the projection of Mayer, as often some few small cells can be discovered either around the antrum or leading in the form of a string of small round cells from the antrum to the Citelli angle. The last cells of this chain lying already in the Citelli angle itself are bordering sinus and dura mater simultaneously. From them an infection of those organs leading to meningitis or sinus thrombosis can start even in cases, where the chronic otitis was in so dormant a condition that the patient was not even aware of it.

*Group 2*—In cases of chronic otitis media in a pneumatised temporal bone, the X-Ray symptoms are entirely different. Like in cases of acute mastoiditis we have first of all to localise carefully, where cells are present. Again special consideration is to be given to cells in the zygomatic process, the Citelli angle and the tip of the petrous bone. The second task will be to study the condition of the cells themselves. They will be found opaque, the walls will be rough and unsharp, the bone tissue between the cells often sclerotic as a sign of repair after previous inflammation. In these cases it is often extremely difficult to determine, how far the changes are the result of previous inflammations and how far they correspond to an acute exacerbation. It will be of great advantage, if X-Ray pictures taken at an earlier time are at our disposal, so that the conditions in the previous and the recent pictures can be compared. If this is not the case and if the clinical conditions are not imperative for immediate operation, a re-examination after 10-14 days proves often very informative. Some of the cells may have grown in size due to destruction of their surroundings or clear round spaces may have occurred, where formerly spongy bone was present. Care must also be taken in the localisation of these centres of destruction with a special view to ascertain if they border the sinus or the middle skull fossa. Findings of this kind are often the strict indication for an operation, even if the clinical symptoms are not disquieting.

*Group 3*—Especially interesting are the X-Ray findings in cases of cholesteatoma. The growth of the cholesteatoma is expansive, i.e., the main factor for the growing of the cavity filled by the cholesteatoma lies in the pressure exercised by the latter on the bone walls surrounding it. Like all bone cavities growing in this way, the cavity obtains a cyst-like appearance. The walls are globe shaped or polycyclic, the outlines sharp. In most

cases the wall between antrum and attic is destroyed first and antrum, attic and external acoustic meatus form a kidney shaped clear space, as visible in the projection of E G Mayer (Fig 3) If the cholesteatoma increases further in size it leads to a perforation of the tegmen or the wall of the sinus as

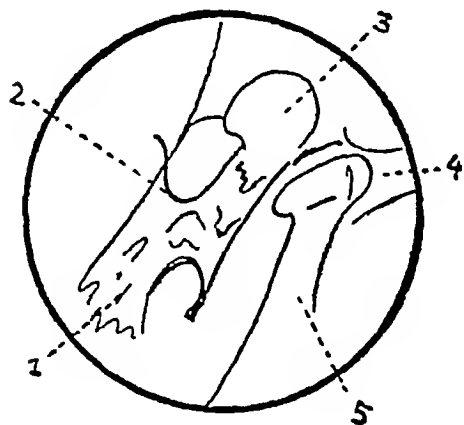


Fig 3 Diagram of E G Mayer's projection of a temporal bone with cholesteatoma —

- (1) tip of petrous bone
- (2) tip of mastoid process
- (3) cholesteatoma of antrum and attic The inner upper part of the posterior wall of the external acoustic meatus (vide arrow in fig 2) is destroyed
- (4) zygomatic process of temporal bone,
- (5) condyloid proces of mandibula

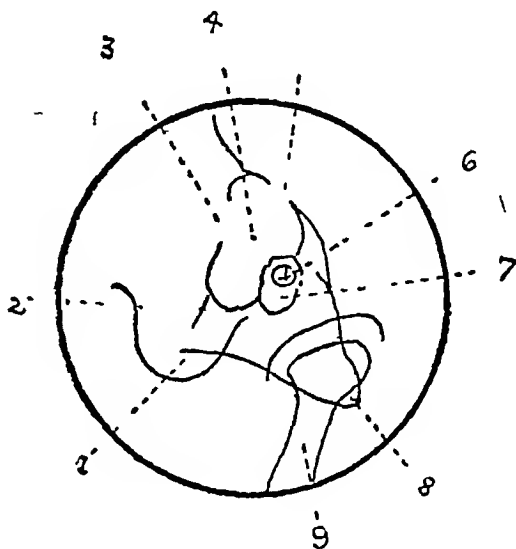


Fig 4 Diagram of Schueller's projection of a temporal bone with cholesteatoma —

- (1) mastoid process
- (2) posterior wall of petrous bone,
- (3) perforation of bone wall of sinus by cholesteatoma
- (4) antrum dilated by cholesteatoma
- (5) perforation of tegmen antri by cholesteatoma
- (6) internal acoustic meatus,
- (7) external acoustic meatus
- (8) tip of petrous bone
- (9) condyloid process of mandibula

visible in the projection of Schueller (Fig 4) In cases of acute otitis, such perforations cannot be seen, even when the symptoms of meningitis or sinus thrombosis are already present, because due to the extraordinary violence of the infection submacroscopic holes can suffice for the propagation. The cholesteatoma on the other hand develops slowly and does not cause virulent infections of the organs of the neighbourhood Nevertheless in all cases, in which the X-Ray symptoms of a cholesteatoma are present, operation has to be performed and detailed information about the extension of the process and its relations to sinus and dura mater will be highly appreciated by the surgeon.

Let us stress the value of the X-Ray diagnosis in cases of chronic otitis media

No 1 It gives us detailed information about the extent and anomalies of the pneumatisation.

No 2 It discloses the pathological features of the cells, if any

No 3 It reveals the presence of anomalies in the position of sinus and dura mater

No 4 It shows the presence of a cholesteatoma

Some remarks may be added about the examination of operated temporal bones The reasons for the examination in these cases are manifold

1 Often it is not known if some years ago a simple or a radical mastoid operation has been made

2 Sometimes the clinical symptoms do not stop entirely after the operation In these cases it has to be ascertained, if and where cells have been left behind during the operation and what is their condition

3 Sometimes pathological growth can be found months or years after the operation

Ad 1 It is easy to distinguish the simple and radical mastoid operation in the X-Ray picture, if E G Mayer's projection is consulted The main difference between the two operations lies in the removal of the inner upper part of the posterior wall of the external acoustic meatus The exact point, on which this wall is removed, is marked in the diagram Fig 2 by the point of the arrow If this bone plate is interrupted or lacking to a large extent, the operation performed was a radical mastoid operation. The labyrinth operations can also be seen in X-Ray pictures especially in the projections of Stenvers and E G Mayer But as the presence of fistulae of the labyrinth can be easily revealed by clinical examination methods, the radiological symptoms must not be discussed here

Ad 2 It happens rather often that cells lying in the periphery of the pneumatised area are left behind during the operation, especially if the exact anatomical details about the pneumatisation have not been ascertained before by an X-Ray examination Cells of this kind are often to be found in the root of the zygomatic process or in the retrofacial and epibulbar regions In these cases the exact localisation can be made by X-Ray examination and the opacity of the cells and destruction of the bone septa can be seen A detailed report about this condition will facilitate the re-operation Schueller's and E G Mayer's projection will be essential for this purpose

Ad 3 In some cases the usual reparative changes of the borders of the operation defect do not take place The defect increases in size, the out-

lines are rough and irregular, the surrounding bone looks moth-eaten. These symptoms point to the presence of a carcinoma operated under the wrong diagnosis of a chronic otitis media. In other cases the defect gains a regular globeshaped form with sharp outlines. These cases are recidive-cholesteatomata.

Let us stress the value of the X-Ray examination of operated temporal bones.

No 1. It reveals if a simple or a radical mastoid operation had been performed.

No 2. Persistence of the clinical symptoms can be explained by the radiological disclosures of non-removed cells. These findings facilitate re-operation.

No 3. Carcinomas and recidive-cholesteatomata can be found.

The X-Ray examination of the temporal bones are also of great value in cases of tumours of middle and posterior skull fossae and in skull fractures. As the radiography of the temporal bones in these cases is part and parcel of the examination of the skull as a whole it shall not be dealt with separately. The very interesting cases of malformations of the temporal bone are of no clinical value whatsoever and thus no subject to be treated in this journal.

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# SOME OBSERVATIONS ON PERFORATED PEPTIC ULCERS

BY

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*Introduction*—For the purpose of these observations, I have surveyed 107 cases from the records of the Government General Hospital, Madras. All these cases were operated upon and the pre-operative diagnoses were confirmed by the operative findings. Though these cases were admitted into the Hospital for perforation between the beginning of January 1932 and the end of March 1939, they do not represent all the cases of perforated peptic ulcers during this period, as many cases of peritonitis, probably due to perforated peptic ulcers, were not operated upon either because the patient refused an operation or because the patient's general condition was so bad that no surgery could be contemplated.

Of these 107 cases, 76 were duodenal perforations, 28 were gastric perforations and 2 were gastro-jejunal perforations, the exact site of one perforation was not mentioned. Thus in this series, the incidence of duodenal to gastric perforations is in the proportion of 76 to 28, i.e., 2.7 to 1. The proportion of non-perforated duodenal ulcers to non-perforated gastric ulcer cases in this Hospital is 30 : 1 (Cruickshank '37). The comparatively high incidence of gastric perforations in this series is due to either (a) gastric ulcers being very much more prone to perforation than duodenal ulcers, or (b) errors having crept into the operative findings. That such errors can occur has been accepted by eminent surgical authorities. These errors are due to.—

(i) At the time of operation, the inflammation and the adhesions around the perforation, and often, the induration of the ulcer that has perforated, prevent any definite diagnosis being made between a juxta-pyloric gastric perforation and a duodenal perforation just beyond the pylorus.

(ii) The general condition of the patient often does not permit any prolonged search for the detailed anatomical situation of the perforated ulcer.

That these errors may have crept into this series is all the more probable when it is realised that 15 out of the 28 gastric perforations were pyloric ulcer perforations.

*Sex*—Of these 107 cases, 106 were males and only 1 was a female. The proportion of males to females in non-perforated peptic ulcers surgically

treated in this Hospital is 26 to 1 Hence, perforations of peptic ulcers seem to be very much more common (about 3 times as common) in males than in females The more frequent alterations of the intra-abdominal pressure due to the hard labour in males is probably responsible for the greater proportion of perforated peptic ulcers in males

*Age*—No age was recorded in 6 of these 107 cases The age incidence of the perforation in the remaining 101 cases has been analysed hereunder

For purposes of comparison, the age in years, of the cases has been grouped into 5 year periods As there is no case of perforation below 15 years of age and after 60 years of age, the 5 year groups have been arranged as follows —

Group I	15 to 19 yrs	Group VI	40 to 44 yrs
Group II	20 „ 24 „	Group VII	45 „ 49 „
Group III	25 „ 29 „	Group VIII	50 „ 54 „
Group IV	30 „ 34 „	Group IX	55 „ 60 „
Group V	35 „ 39 „	Group X	above 60 yrs.

The combined incidence of both gastric and duodenal perforations together, is first considered and then the separate incidence of duodenal and gastric perforations is considered The results are as follows —

Groups.	I	II	III	IV	V	VI	VII	VIII	IX	X
No of gastric & duod. perforations	1	7	19	23	17	11	5	7	6	Nil
No. of duodenal perforations,	1	3	17	17	11	8	5	4	4	Nil
No of gastric perforations	Nil	4	2	6	6	3	Nil	3	2	Nil

It will be seen from these findings, that peptic ulcer perforations were commonest between the ages, 25 and 39 years This agrees with the observation that peptic ulcers (non-perforated) are commonest between the years 20 to 40, hence the perforations too are commonest in this age-period

Duodenal perforations were commonest during the age period, 25 to 34 years, whereas gastric perforations were commonest at a slightly later age, viz, between the years 30 and 39 This agrees with the slightly later age incidence of non-perforated gastric ulcers surgically treated in this Hospital

These observations are represented diagrammatically in Figs 1 and 2. For purposes of easy comparison, the incidence of duodenal and gastric perforations are charted side by side in Fig 2

The youngest duodenal perforation case was 17 years of age and the oldest duodenal perforation case was 58 years of age. The youngest case that

had a gastric perforation was 20 years of age, while the oldest case that had a perforated gastric ulcer was 60 years of age

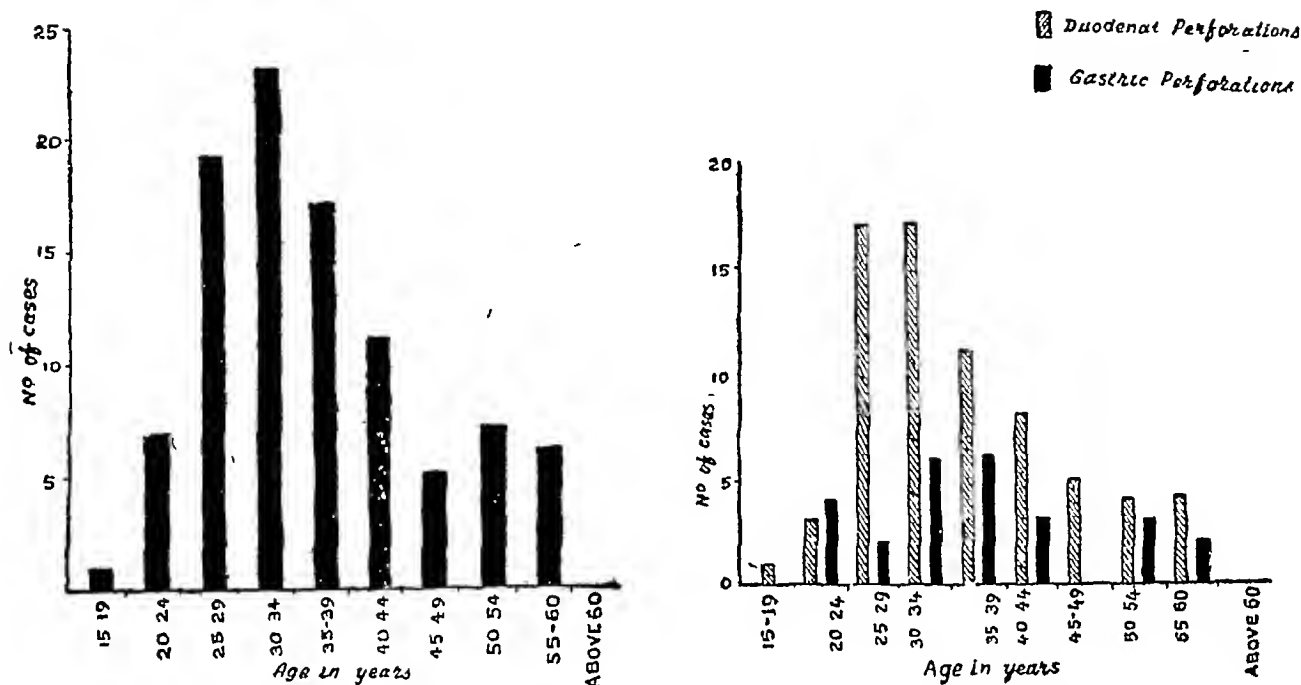


Fig 1. Age Incidence of Duodenal & Gastric Perforations—considered together

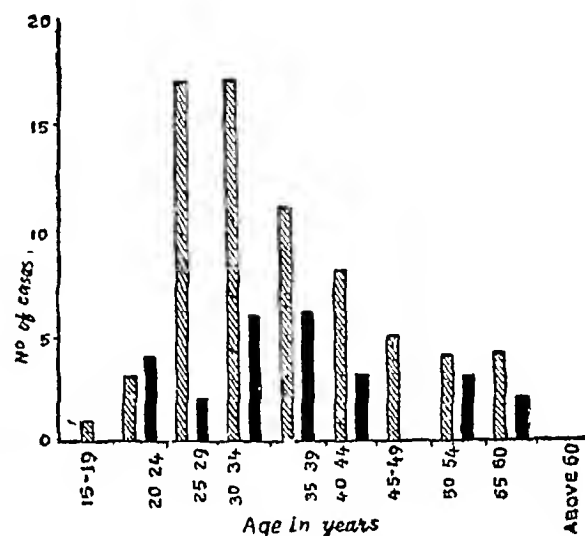


Fig 2. Age Incidence of Duodenal & Gastric Perforations—separately

Both the gastro-jejunal perforations occurred in the 35th year.

*Site of perforation*—It has already been stated that 76 were duodenal ulcer perforations and 28 were gastric perforations

Of the 76 duodenal perforations, 59 occurred on the 1st part of the duodenum, 2 occurred at the junction of the 1st and 2nd parts, and 2 others on the 2nd part of the Duodenum, the remaining 13 perforations were described as "perforated duodenal ulcer," the exact site in the duodenum not being mentioned

Of the 59 perforations on the 1st part of the duodenum, 30 were definitely stated to be anterior duodenal ulcer perforations and one was stated to be a posterior perforation, the remaining 28 were merely stated to be perforations on the 1st part of the duodenum, the anterior or posterior situation of the ulcer not being mentioned

It was not stated whether the 2 perforations at the junction of the 1st and 2nd parts of the duodenum, were anterior or posterior

The 2 perforations from the 2nd part of the duodenum were anterior ulcer perforations.

Thus of the 33 duodenal perforations, the exact sites of which were mentioned, 32 were anterior duodenal ulcer perforations and 1 was a posterior ulcer perforation

Of the 28 gastric perforations, 15 were stated to be in the pyloric region, and 9 were in the body of the stomach, the exact sites of 4 gastric ulcers were not mentioned. Out of the 15 ulcers, in the pyloric region, 13 were stated to be anterior ulcers, whereas the remaining 2 were posterior ulcer perforations

Only one of the 9 perforations in the body of the stomach was situated close to the cardiac end on the anterior aspect. The remaining 8 perforations were distributed as follows —

One was a posterior gastric ulcer perforation, the perforation being situated about the middle of the stomach, nearer the cardiac than the pyloric end, 5 were anterior ulcers, very close to the lesser curve of the stomach, two were stated to have been situated on the "anterior surface of the body of the stomach"

Thus of the 24 gastric ulcer perforations, whose sites were known, 21 were anterior gastric ulcers and 3 were posterior

*No of perforations* — In only one case in this series, was more than one perforation found. In this case, who was a male, 36 years of age, the perforation was of 10 hours duration. There was one anterior duodenal ulcer perforation 1 cm in length very close to the pylorus, the other perforation was 1 cm distal to this perforation and was 3 mm in size. This case died within 24 hours after the operation

*Onset of perforation, etc* — No particular part of the day or of the night seemed to be specially prone to the onset of perforation, in this series of cases, as peptic ulcer perforations had occurred at almost all hours of the day

No definite exciting or predisposing cause (excepting the presence of a peptic ulcer, especially in the anterior position) could be ascertained in this series

*Operative treatment adopted* — All the cases that have been included in this paper were cases that were operated upon, all of them being acute abdominal emergencies

Spinal anaesthesia seemed to have been the mode of anaesthesia of choice in this series, though general and local anaesthetics were used in a few cases. 14 cc to 16 cc of 1% Novocaine in saline was the most commonly used anaesthetic, Percaine solution 1 in 1500 was used in a few cases

In 74 of these 106 cases, the operation on the perforation was limited to closure of the perforation by a double layer of sutures. In 27 cases, in addition to closure, the omentum was used to reinforce the closed perforation. Only in 2 cases was a gastro-jejunostomy performed, one of these two cases lived, and the other died on the 13th day after the operation (the cause of death was not mentioned in the records).

*Mortality*—Out of the 107 cases of peptic ulcer perforations surveyed here, 48 cases died, giving a mortality of 44.9%.

Eleven out of the 28 gastric perforations, were cured and 17 died, giving a mortality of 60.7%.

Of the 76 duodenal perforations, 44 were cured, 31 died and 1 case was taken home by the relatives against Medical advice on the 3rd day after the operation. These figures give a mortality of 41.3% for duodenal perforations.

Both the gastro-jejunal perforations were cured.

*Mortality according to age-groups*—The mortality according to the age-groups is tabulated below. They are considered in the following age-groups: 15 to 19 years, 20 to 29 years, 30 to 39 years, 40 to 49 years, 50 to 60 years.

Age	No of cases	No of cases died	Mortality	Mortality for perforated gastric and duodenal ulcers together according to age-groups.
15—19 yrs	1	Nil	0%	
20—29 „	27	6	22.2%	
30—39 „	41	21	51.2%	
40—49 „	17	8	47.1%	
50—60 „	12	10	83.3%	

Age	No of cases	No of cases died	Mortality	Mortality for duodenal perforations alone, according to age groups
15—19 yrs	1	Nil	0%	
20—29 „	20	4	20%	
30—39 „	29	14	48.3%	
40—49 „	13	5	38.5%	
50—60 „	7	5	71.4%	

Age	No. of cases	No of cases died	Mortality	Mortality for gastric ulcers alone, according to age-groups.
15—19 yrs	Nil	Nil	Nil	
20—29 „	7	2	28.6%	
30—39 „	12	7	58.3%	
40—49 „	4	3	75%	
50—60 „	5	5	100%	

These observations are represented diagrammatically in Figs 3 and 4

It will be observed from these figures that the mortality for peptic ulcer perforations increases with the age of the patient. The mortality is particularly high after 50 years of age.

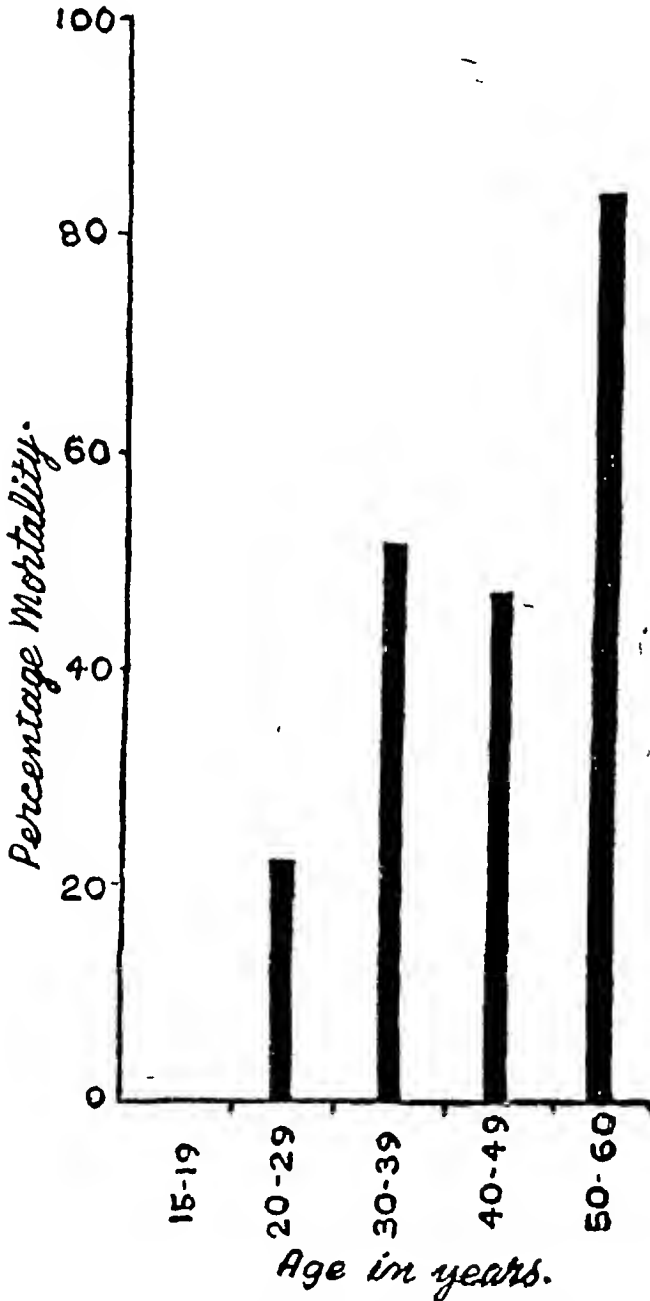


Fig 3 Mortality according to age for Duodenal & Gastric perforations, taken together

*Mortality according to the duration of perforation*—For purposes of comparison, the duration is divided into the following groups —

- (1) Cases that were operated upon within 6 hours after the perforation.

- (2) Cases that were operated upon between 7 hours and 12 hours
- (3) Cases that were operated upon between 13 hours and 18 hours after perforation.

▨ = Duodenal perforations  
■ = Gastric perforations.

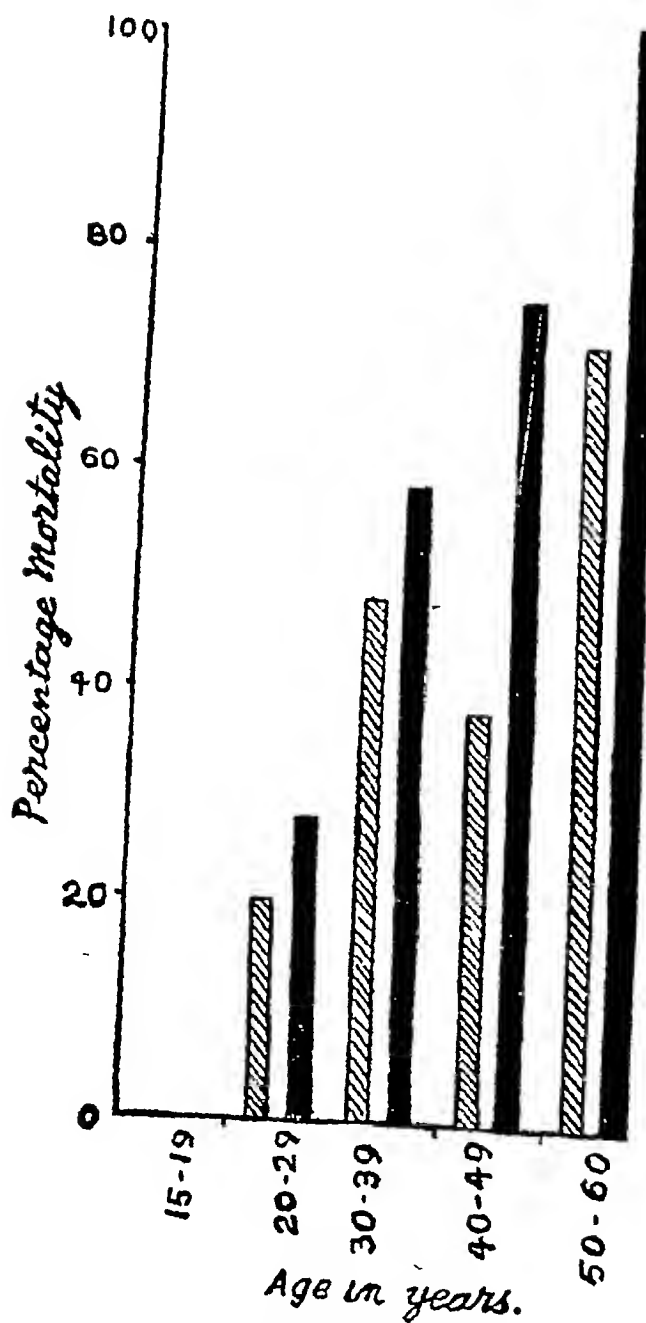


Fig. 4 Mortality according to age for Duodenal & Gastric perforations taken separate

(4) Cases that were operated upon between 19 hours and 24 hours after perforation

(5) Cases that were operated upon beyond 24 hours after perforation

The results are tabulated below —

Duration	No. of cases	No. of cases died	Mortality	Mortality for gastric & duodenal perforations, according to duration of perforation.
Within 6 hrs.	14	3	21.4%	
7 to 12 hrs	29	9	31%	
13 to 18 „	9	5	55.6%	
19 to 24 „	13	7	53.8%	
Beyond 24 „	26	20	76.92%	

Duration	No. of cases	No. of cases died	Mortality	Mortality for duodenal perforations, according to duration of perforation
Within 6 hrs.	10	2	20%	
7 to 12 hrs.	19	5	26.3%	
13 to 18 „	7	3	42.9%	
19 to 24 „	10	5	50%	
Beyond 24 „	18	12	66.6%	

Duration	No. of cases	No. of cases died	Mortality	Mortality for gastric perforations, according to duration of perforation
Within 6 hrs.	4	1	25%	
7 to 12 „	10	4	40%	
13 to 18 „	2	2	100%	
19 to 24 „	3	2	66.7%	
Beyond 24 „	8	8	100%	

These observations are recorded diagrammatically in Figs 5 and 6

Out of the 18 cases of duodenal perforation, that were of more than 24 hours duration, only 6 lived. The following were the durations of perforation before operation for these 6 cases —

- 1 case was of 42 hours duration,
- 2 cases were of about 48 hours duration,
- and 3 cases were of about 72 hours duration

It will be observed from these that the mortality increases with the duration of perforation. The mortality suddenly increases in cases operated upon after 12 hours after the perforation and is very high in those cases that are operated upon after 24 hours after the perforation.

Further, whatever the age of the patient or the duration of perforation, the mortality for gastric perforations is always higher than the mortality for duodenal perforations.

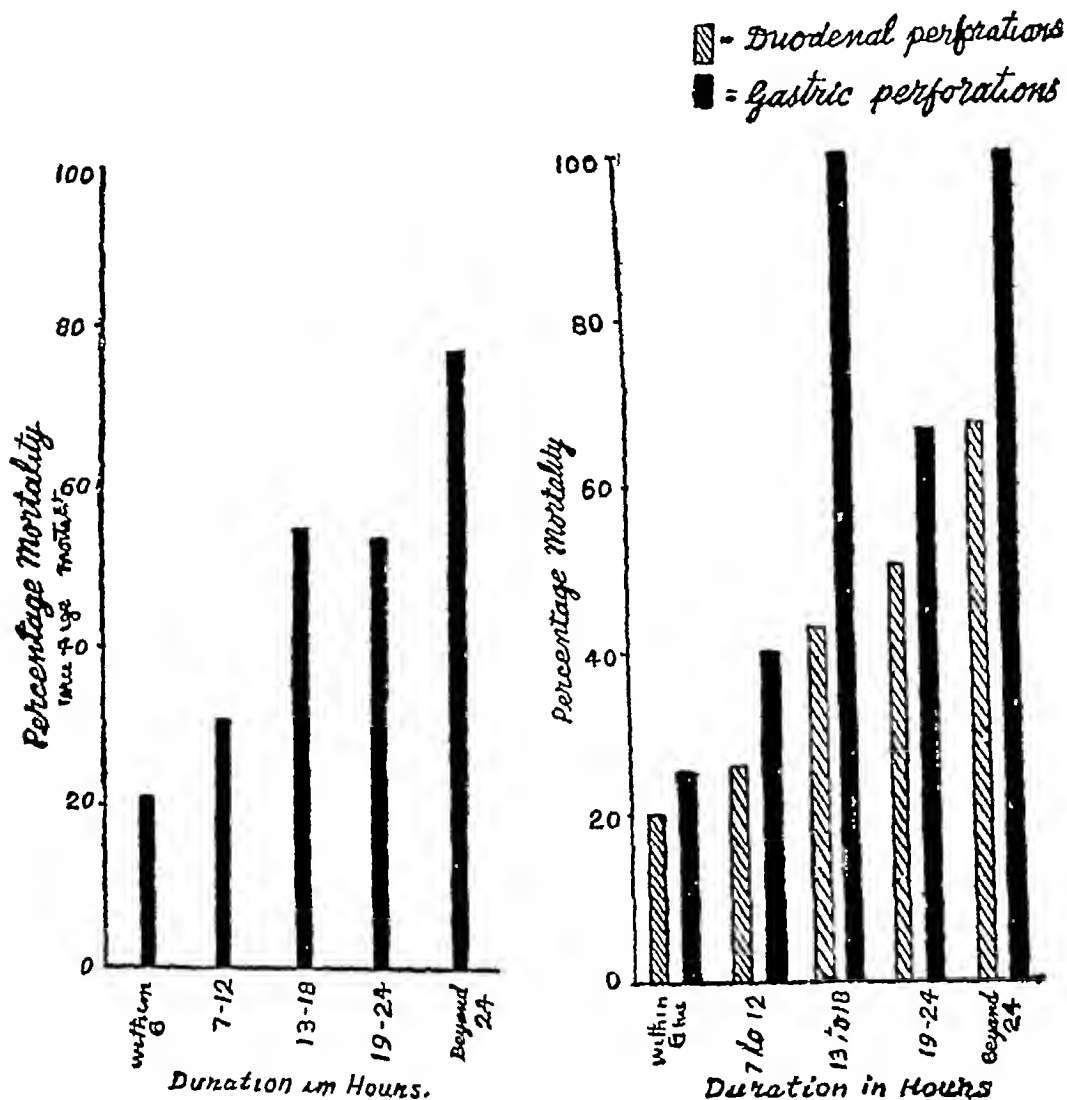


Fig. 5 Mortality according to duration of perforation, for Duodenal & Gastric perforations, taken together

Fig. 6 Mortality according to duration of perforation, for Duodenal & Gastric perforations, taken separately

*Mortality according to the site of perforation*—Among the 24 gastric perforations, the exact sites of which were mentioned, it has already been stated that 15 were close to the pylorus and 9 were elsewhere in the body of the stomach. Of the 15 perforations that were close to the pylorus, 7 died, giving a mortality of 46.7%, whereas of the 9 perforations elsewhere on the stomach, 7 died, producing a mortality of 77.8%. Thus perforations near the pylorus have a better prognosis than perforations on the body of the stomach.

The mortality for all duodenal perforations, irrespective of age of the patient and the duration of perforation, is 41.3%. It will be seen from these observations that the mortality for perforations is least if the perforations are in the duodenum, it is slightly more for perforations in the pyloric region, whereas it is highest for perforations in the body of the stomach.

### Summary and Conclusions

- 1 107 cases of perforated peptic ulcers have been surveyed for the purposes of this paper
- 2 The proportion of duodenal to gastric perforations is 2.7 to 1
- 3 There was only one female in these 107 cases
- 4 All perforations are commonest between the third and fourth decades of life. Duodenal perforations are commonest between 25 and 34 years of age, whereas gastric perforations are commonest between 30 and 39 years of age.
- 5 Anterior ulcers perforate most commonly
- 6 The perforations are commonest in the duodenum, then in the prepyloric region and least common in the body of the stomach.
- 7 Closure of the perforation with two layers of suture is the commonest operative procedure adopted in this series
- 8 The mortality for all peptic ulcer perforations in this series is 44.9%. The mortality rate increases with the age of the patient, the duration of the perforation and the proximity of the perforation to the body of the stomach.

My thanks are due to Lt-Col McRobert, I.M.S., Superintendent, Govt General Hospital, Madras, for permission to collect my material from the Hospital Records and to publish this paper.

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# AN UNUSUAL CASE OF URINARY RETENTION

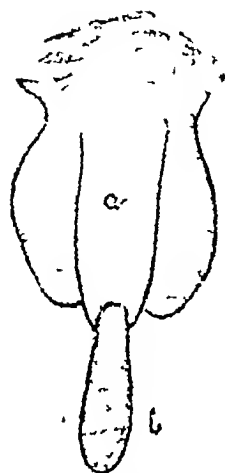
BY

G D KAPUR

A child—Surinder Kumar, aged one year and eight months—was brought to me near mid-night on 7th August 1943, with acute retention of urine. The parents gave the history that for the previous 3 or 4 months, the child was having difficulty in micturition. There was straining, occasional passage of a few drops of blood, frequent rubbing of the glans penis, and in between the child often passed urine freely, without the least discomfort. As the intermittency lessened and difficult micturition became more pronounced the parents were told that the child had a stone in the bladder and were advised to take him to the Hospital. There the child was anaesthetised and sounded for a stone. None having been found, the trouble was ascribed to phimosis and the parents were advised to get the child circumcised a few days later, when the effects of this anaesthesia had passed off. Thereupon that day the child is reported to have passed a peaceful day the flow of the urine was free and uninterrupted. The following day, however, in the afternoon the child developed retention. As the child became restless, it cried and strained but could not pass a drop of urine. By the evening the parents got alarmed at noticing a curious looking red raw and fleshy protusion from the external urinary meatus. The more the child cried and strained to void urine, the more this mass grew in size till it looked almost like a second penis projecting out of the original penis. They hurried the child to the same Hospital when the officer on duty slit the dorsum of the glans in a vain endeavour to extricate the mass out of the enlarged external urinary meatus. This added bleeding to his retention. Facing an unusual eventuality, this officer directed the parents to seek help in another bigger sister Hospital. Running from one place to another, and getting no satisfaction even there, the misery of the child increasing with passage of time, the parents eventually were referred to me at an unearthly hour. On examination the child looked well nourished and grown up for its age with an expression of fright and fear on its face. A swelling 3.0 cm long and 2.75 cm in circumference, red, succulent turgid closely resembling a prolapsed rectal polypus, was seen protruding from and jamming the external urinary meatus. The penis itself measured 3.5 cm. in length. The swelling projected more when the child cried, retracted to some extent into the urethral canal when the child was quiet. It gave one the impression that the urethra was the sheath, and this protruding mass the penis, which projected and retracted, within its sheath, as the child strained or was quiet. Or that there

were 2 penile organs one in front of the other marked by a constriction at the original external urinary meatus

Front View



Lateral View.



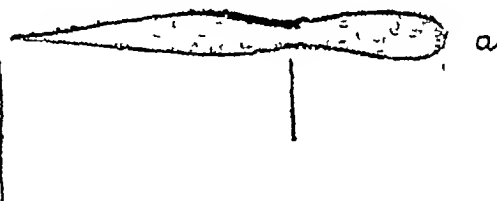
Fig 1 (a) Penis 3.5 cm long.  
(b) Polypus 3 cm long red succulent and turgid

Fig 2 As if the urethra was the sheath and this growth the penis or two penile organs one in front of the other,

It projected on straining when the child cried and partially retracted into the urethral canal when the child was quiet

Specimen as removed in the fresh condition & measured

10 cm long



7 cm inside

3 cm. outside

Point of attachment  
white & less vascular

Constricted  
at the meatus

Fig 3 Microscopic Examination

Section of the tissue show a large number of blood vessels filled with red blood cells. The stroma consists of delicate connective tissue fibrils. The periphery of the tumour consists of condensed fibrous tissue. These histological features suggest a diagnosis of haemangioma.

The child was immediately anaesthetised. Steadying the penis by the left hand and retracting it as far back as its root, the growth was gently pulled out by the right hand but it appeared to arise rightaway from far back inside the bladder base, so that although one could withdraw it out more and more, the moment the traction was relaxed, it would slip back into the urethral canal. After several fruitless attempts I pulled it out as much as I could, then applied a haemostat at the proximal level and began winding the pedicle on the haemostat after the fashion of extracting a guinea-worm, till a thread-like point of attachment—white in colour—appeared and the growth was twisted off at its base. The fresh specimen when removed measured 10 cm long, i.e., 7 cm inside the urethra extending into the bladder and 3 cm. outside. A portion from the distal part was cut for, microscopical examination and the pathologist reported it to be a capillary haemangioma.

### Comment

The cause of urinary trouble culminating in retention is the impaction of a foreign body in the urethra, although in this case the foreign body happens to be a new growth springing probably from near the vicinity of the trigone of the bladder. Whenever it was carried into the canal of the urethra by the urinary stream, dysuria started, as soon as it returned inside the vesical cavity, the flow became easy and free. That explains the intermittancy of symptoms. As the pedicle lengthened, the growth jammed the passage and caused retention. By overstraining, it presented at the external urinary meatus, just as a papilloma of the rectum, often, presents at the anal orifice. The straining continuing and the limiting influence of the urethral canal being eliminated, it continued to increase rapidly in size till it was removed.

Papilloma is the usual benign growth from the bladder mucosa, its being a haemangioma' marks it as one of the rarities.

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# SIMPLE DERMOID CYSTS OF THE OVARY

BY

CAPT M G KINI, M C, M B, M CH (ORTH), F R C S E, F R S E,

SURGEON AND SUPERINTENDENT, STANLEY HOSPITAL, MADRAS

Statistical records of the incidence of Dermoid cysts in the region of the ovaries varies in different countries Kroemer (Lit) quoted by Ewing stated that Dermoids constituted about 10 per cent of the ovarian tumours A review of a 10 year period record from 1932 of ovarian tumours in the Government Hospital for Women and Children, Madras, shows that out of a total of 342 ovarian cysts and tumours, 9 were true Dermoid cysts, 266 were cysts of all kinds Of the 342, 76 were malignant tumours

These cases do not generally come under the purview of the General Surgeon The Gynaecologists usually see more of them These Dermoids appear, it is stated by Ewing, at all ages, even in children, and most frequently between 30 and 40 years Cases of Dermoids are sometimes admitted on the surgical side as tumours of the abdomen giving difficulty in diagnosis Sometimes they are admitted for acute abdomen with peritonitis The following three cases will be of interest in illustrating the points mentioned above —

1 A Hindu female, aged 55 years, was admitted for a tumour in the abdomen in 1939 She was the mother of four children and had attained menopause about 8 years before She came with a history of a tumour which became appreciable in a short time She had no complaints before In 4 months it rose up to the umbilicus in the midline and appeared like an enlarged uterus On examination it was found that it rose from the left side and apparently was connected with the ovary It was diagnosed as ovarian cyst and operated on At operation it was found that it was a case of dermoid cyst with lots of hair and sebaceous material but no teeth, in the sac She made an uneventful recovery and is keeping good health X-Ray examination did not show any calcified shadows in the region of the tumour

2 A girl aged 10 years was seen in May 1942 for a tumour which was in the region of the umbilicus more towards the right and appeared elongated It had grown in a few months' time It did not move with respiration but could be moved from side to side and slightly upwards and downwards Rectal examination showed a big bulge on the right side Ballotment could be elicited As the tumour was more or less median, the question of an urachal cyst was considered and ruled out by defining the bladder by X-rays after filling with Sodium Iodide solution (Fig 1) This X-ray also showed a curved, horse shoe shaped, dense shadow due to calcified material on the extreme right upper part of the soft shadow This soft shadow appeared to be resting on the top of the bladder, causing a dent on the full bladder and was distinct from the bladder A diagnosis of ovarian dermoid was made based on the X-ray findings and she was operated on A dermoid cyst arising from the right ovary was removed Patient made an uneventful recovery and in reply to a letter she reported that she was doing well

3 A Hindu woman, aged 56 years, was admitted in 1943 for pain and swelling of the abdomen and difficulty in passing urine. On admission her general condition was found to be all right except for the marked swelling of the lower abdomen. Vaginal examination showed a bulge in the pouch of Douglas. She was constipated at the time of admission, not passing flatus or faeces but as she was under observation and while being prepared for operation, she passed a lump of faeces with a lot of flatus. A diagnosis of intestinal obstruction probably localised tubercular peritonitis (?) was made. She was operated on under local anaesthesia. On opening the abdomen, through a left para



Fig 1

median incision, cheesy looking material came out and in it there were a few hairs that looked like fine Lanugo. A suppurating Dermoid was at once diagnosed. Inflammation was confined to the infra colic compartment and had extended into the leaves of the mesentery which appeared glued to each other along with loops of intestines. All the cheesy looking material was sucked out and the leaves of the mesentery were mopped up, cleaned, separated and freely plastered with Streptocide. The abdomen was closed with difficulty due to the friable nature of the peritoneum. The abdomen was drained—one drain was used in the supra pubic region in the midline draining the pouch of Douglas, another drain was used in the right para colic gutter brought out in front of anterior superior iliac spine, and a third drain was used to drain the left para colic gutter in front of the left anterior superior iliac spine.

She had a rather stormy recovery with lung complications. She was discharged from the hospital two months after the operation with an appreciable herniation of the lower abdominal wall. She was asked to return at the end of a year.

### Points of Interest

1 Three cases of simple dermoid of the ovary cysts are described (illustrating the incidence of this condition at different ages)

2 Of these three cases, two (1st and 3rd cases) occurred after the 5th decade and the other (the 2nd case) in the first decade. In two cases, X-rays were taken (1st and 2nd case). In the first case no calcification was shown. In the second case X-ray was definitely diagnostic and helpful. The third case was admitted for acute abdomen and operated on with a diagnosis of intestinal obstruction and localised tubercular peritonitis of the lower abdomen (?). It was found at operation to be a suppurative condition of the dermoid cyst which had burst into the peritoneal cavity.

3 The use of Streptocide has been found very useful in infective conditions of the peritoneum generally and in this case in particular. Some remarkable recoveries have been seen since the use of this drug in acute peritonitis.

I have to thank Major G. B. Thomas, I.M.S., Superintendent, Government Hospital for Women and Children, Madras, for his personal communication giving the classification of tumours of the ovary in that hospital.

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## ABSTRACTS

*Skin Grafting in the Treatment of Wounds by A H McIndoe, FRCS, FACS*  
(Proc Roy Soc Med., Vol XXXVI, p 647 ff, October 1943)

A good summary of the present state of practice in skin grafting. During this war it has been found increasingly true that the best dressing in the world is a skin graft, and of late it has become recognised that portions of wounds and burns should be grafted as early as possible, without waiting for the whole wound to be in a condition to take grafts. "The early application of skin to a raw surface is as important as the early immobilisation of a fractured bone." Skin grafting is advocated not only for superficial granulating surfaces, but far more urgently for wounds in which tendons, bones, and joints are exposed. For this type of wound a blood supply is necessary. The exposed structures do not want to supply blood to a graft, they want a graft to supply blood to them, and for this type of injury pedicled flaps taken from the abdominal wall, or thigh, or from whatever part of the body may be most convenient for the particular injury, are to be used.

A plaster case is an excellent medium for the growth of granulation tissue and the repair of bone, but is a poor healer of skin. Plaster casing should therefore not be persisted in too long in cases where there is loss of skin. As soon as the bony lesion will allow, the plaster must be removed and the skin dealt with by grafting as early as possible. The loss of a square inch of skin from an eyelid may involve the destruction of the eyesight, in the region of interphalangeal finger joints it may lead to sloughing of extensor tendons or incurable contractures of the flexors. Other important areas are the back and front of joints, as knee or elbow, and the palm of the hand.

After excision of a wound, a skin graft may be applied immediately, usually over a sprinkling of sulphonamide powder. A granulating surface should be ready for grafting in 10 days. Third degree burns treated with sulphonamide should be grafted at the third week. Saline dressings over 'tulle gras' (or single thickness vaseline gauze), or half-strength eusol, are recommended. 1% acetic acid alternating with sulphathiazol powder are good for *B pyocyaneus*. Any organism capable of producing pus sufficient to raise a graft from its bed in 24 hours will prevent the graft from taking. A healthy skin edge is a more reliable guide than bacterial counts from smears. Ultraviolet rays, infra-red rays, silver nitrate, or caustics must never be used in skin-grafted cases.

The types of graft used are —

(1) Small deep (Reverdin's) grafts, 3 mm in diameter, spaced at least one per sq centimetre. Bandage with pressure (rubber sponge) for 3 days.

For all extensive raw surfaces where continuous sheet grafts are impracticable

(2) Thiersch grafts of postage-stamp size, or rather smaller. Better cosmetic results, for faces, etc and backs of hands in which tendons are not exposed.

(3) Thin epidermal grafts cut from the upper arm for eyelids.

(4) Thick razor grafts (Wolfe grafts). Applied under single vaseline gauze, with pressure and saline dressing for 5 days. Most satisfactory for covering surfaces up to 8×6 inches, especially in face, neck, and hands.

(5) Pedicled flaps. Should be done as soon as possible for cases in which tendons are exposed, especially palms of hands, flexor surfaces of fingers, heel, and dorsum of foot. (Hand grafts from abdominal wall, foot from front of other thigh just above knee). Grafts 2, 3 and 4 can be cut in large size, put on to a piece of vaseline gauze or tulle gras (moş-

quito netting), and then graft plus gauze is cut into  $\frac{1}{2}$  inch square, and applied, with small intervals for drainage, over the raw area

T H S

*Discussion on Poliomyelitis by Prof S P Bedson, F.R.S and others (Proc Roy Soc Med, Vol XXXVII, p 41, December 1943)*

This serious and alarmingly increasing disease is of great importance to surgeons. It seems probable that it is conveyed by the faeces, as well as by droplets sneezed from the nose into the air. The incubation period is established as 10 to 14 days.

The most important observation made during this discussion is that all persons who are known to have taken violent exercise after the initial infection have been paralysed, especially in the muscles which were most used. Walking being the usual exercise, the legs are usually affected, a pianist was paralysed in both arms, it is suggested that these activities tire the anterior horn cells, and on the onset of the disease, absolute rest must be taken, if this is done cases have been found to have no paralysis at all, or slight and temporary paresis only. The difficulty, of course, is to diagnose the fever of poliomyelitis from, say, influenza.

T H S

*Immediate Blood Transfusion in Obstetric Shock by I S Fox (B.M.J, ii p 781, December 1943)*

A case which was practically dead from obstetric shock—pulse imperceptible, breathing stopped, after no post-partum haemorrhage—was restored to normality by the transfusion of two pints of blood. This leads to a speculation on the irreversible character of delayed shock, as against the reversible (i.e. treatable) character of immediate shock. In 765 transfusions for obstetric shock and/or haemorrhage, (Ref, Sheehan, H L (1942) Lancet, 1, 616) the mortality from shock was unaffected, only that from haemorrhage being relieved. The value of blood transfusion in shock "is therefore doubtful," and the writer is of opinion that the reason for this conclusion is that primary shock transfused rapidly is a curable condition, whereas if some hours' delay is allowed to occur the shock becomes "irreversible," i.e., unable to be relieved by transfusion of blood or plasma.

T H S

*Differential Diagnosis of Sciatic Pain by W P U Jackson (B.M.J, ii, p 776, December 1943)*

The rareness of sciatic neuritis is stressed, only 3% of low back and posterior thigh pain being considered as "Sciatica" in this sense. 25% of cases are represented as due to ruptured intervertebral disc (shifting of nucleus pulposus and projection into spinal canal). 31% of cases were diagnosed as fibrositis, 10% as hysterical, 4% as due to congenital bony conditions. Protein in the spinal fluid is usually raised by 40 mg or more per 100 c.c. in cases with ruptured disc. Organic lesions of sciatic nerve produce absence of ankle-jerk. If bilateral this sign indicates strong suspicion of ruptured disc. Radiography (A—P) may show osteoarthritis, or sacralisation of 5th lumbar vertebra (Lat) spondylolisthesis, or thinner lumbosacral intervertebral disc suggesting displacement. Many of the cases of fibrositis were brought on by an attack diagnosed as influenza. A paper by Major Ford Thompson, privately communicated but not yet published, is much fuller in its aids to diagnosis, and stresses that in diagnosing fibrositis movements of the legs (active) in various positions may bring out tender points at ori-

gins and insertions of muscles, etc., and there will be no interference with knee or ankle jerk, or with sensation, in fibrositis

Injections of Novocain into suspected fibrous structures may clinch the diagnosis. The important thing in any case is to establish the diagnosis between three conditions —

*Neural*, signifying pressure on roots or a true neuritis, with loss of jerk, and/or areas of anaesthesia corresponding to segments, wasting of muscles

*Referred*, from fibrositis or other cause, to areas not segmental in distribution, no loss of jerks or sensation.

*Functional*, with no true tenderness, and non-anatomical distribution of pain, etc., as described by the patient

T H S

*Discussion on Penicillin, by Prof Florey Proc Roy Soc Med, Vol XXXVII, p 101, December 1943)*

As yet but few of us have been fortunate enough to possess or to use penicillin. But, it is possible that at no distant date much greater quantities of this precious stuff may come to India. And it is very easy to waste it by not knowing how to use it. This discussion therefore merits a full report, for (as far as present knowledge goes) it introduces the best methods of using penicillin on surgical cases. If we know these, we will be ready, when penicillin comes our way, to use it to the best advantage and with curative effect.

Prof A. Fleming, who discovered penicillin, opened the discussion with an account of its discovery, and useful observations on its properties.

In 1929 Prof Fleming noticed a mould growing by accident on a culture plate of staphylococci. In its neighbourhood the staphylococci were not growing, while in other parts of the plate they were growing vigorously. Instead of throwing away the contaminated plate, as most of us would have done, Fleming made subcultures of the contaminator, and found that the culture fluid on which it grew was strongly antibacterial in its action, besides being non-toxic to animals and to human leucocytes. All previously known antiseptics were more toxic to leucocytes than to bacteria. The sulphonamides had, of course, not been discovered at that time.

Prof Fleming's fluid was, however, unstable, and could not be purified easily for intravenous use, so the cultures of *penicillium notatum* were used for many years in the laboratory for differentiating strains of bacteria, and not used clinically. Cultures were, however, kept up, and all the penicillin at present in Britain is descended from that one accidental contamination of a culture plate in 1929.

Florey at Oxford more recently worked out methods of purifying and concentrating penicillin, and the way was opened for its clinical use in 1940. Research on clinical lines was at once begun by Fleming, and the following facts have been discovered —

- (1) The bacteriostatic power of the blood is enormously increased after an intravenous injection of penicillin but this increase only lasts 2 hours, after which time the power is lost, until more penicillin is injected.
- (2) Intramuscular injection—bacteriostatic increase lasts 3 hours.
- (3) Continuous intravenous infusion—bacteriostatic power of blood is kept up all the time during the infusion.

- (4) Penicillin, like the sulphonamides, is bacterostatic, not bactericidal, it is the leucocytes which have to do the actual killing of the bacteria
- (5) Local application to wounds or infected cavities is effective for a few hours, and clinically should be done every 4 hours for several days  
The discussion was continued by Prof Florey, who added the following data
- (6) Pure penicillin, obtained at great labour and difficulty, will prevent the growth of gram-positive cocci at dilutions of 1 in 50,000,000
- (7) The organisms sensitive to penicillin are strepto-, staphylo-, pneumo-, gono-, and meningo-cocci, anthrax, and the clostridia Typhoid-coli group are very slightly sensitive, tubercle, pyocyanus and others are entirely unaffected by penicillin
- (8) Septicaemia in man due to strepto- or staphylococci can be cured by intramuscular injections of 15,000 units of penicillin every 3 or 4 hours
- (9) Local administration to wounds is effective, if it is repeated every few hours, one initial dose is not effective, except perhaps as a prophylactic in supposedly clean operations

The technique of administration in war wounds and (in general) large septic wounds such as compound fractures, is by the old system of "Carrel's tubes" Several small tubes are arranged in the wound, and made to penetrate the deepest tissues, and through these solutions of penicillin are injected 2 or 3 times daily for 4 or 5 days In nearly every case healing was complete in 10 days

A second technique, for *superficial* sepsis such as burns or less destructive wounds is the application of penicillin in sulphanilamide cream (sodium benzoate, sulphanilamide 5%, penicillin to make 100 units per gram) This is applied thinly, so that one gram of the cream covers 25 sq centimetres of tissue

In late cases with fibrosis, etc, all fibrotic tissue must be removed by operation, and the tissues rendered soft enough to collapse on to spaces and fill them up

In very bad cases (large, dirty wounds) 10,000 units of penicillin are applied to the wound after thorough surgical excision of all damaged tissue (*debridement*) has been done Even 20,000 units may be required. In addition, 10,000 units are given parenterally every 3 hours for 3 days This type of case uses such large quantities of penicillin as to be outside the sphere of practical surgery except in Army or Navy units where supplies are plentiful

In 305 miscellaneous cases, Florey reports 250 complete cures, 41 unproved, 14 no response

Those of us who obtain penicillin will probably at first only be able to get comparatively small quantities Its chief usefulness in moderate or small amounts seem to be the following —

- (1) As a preventive of sepsis in complicated orthopaedic operations such as arthroplasty, when an initial dose in the wound may be sufficient to ensure healing If doubt is felt about infection, injections into the wound (or joint) cavity 2 or 3 times a day for 4 or 5 days should be done
- (2) As a healing agent in septic wounds of small size, especially deep wounds, the more superficial ones can be efficiently treated with sulphathiazol powder or cream.
- (3) For fresh, deep, but potentially infected wounds

- (4) To prevent peritonitis in such operations as gastrectomy, Wertheim's hysterectomy, and other potentially infected abdominal wounds
- (5) For gonorrhoea resistant to sulphonamide therapy—a total of 100,000 units (ten intramuscular injections of 10,000 units) are given, one injection every hour for 10 hours 95% of recoveries have been reported from this treatment

T H S

*Oral administration of Sodium lactate in the treatment of shock from burns by C Fox, M.D (J.A.M.A., Vol 124, No 4, January 22, 1944)*

In this paper Dr Charles Fox, M.D says that as intravenous administration of electrolytes and dextrose solutions have been found disappointing to counteract the effects of diminished plasma volume—hypoalbuminosis and haemo-concentration of blood and for which use of serum, plasma and concentrated human albumin have been used with better results Notwithstanding this Dr Elman has shown that in some cases, intravenous administration of plasma does not invariably correct the haemoconcentration in severe burns In one case in spite of giving 2,000 c.c. of serum, 800 units of adrenaline and 2,500 c.c. of salt and glucose solution the Haematocrit index had increased instead of being diminished

In 1926 Davidson had observed that in burn cases plasma chlorides were very low, urine contains no sodium chloride for as long as three weeks though adequate salt was administered to the patients On the basis of these facts Dr Fox treated his cases suffering from shock due to burns, with Sodium lactate instead of plasma by giving it orally His method consists of treating burn cases on admission with morphia  $\frac{1}{4}$  gr and then administering 17 c.c. sodium lactate solution with glucose, iced, by mouth every 15 minutes till 10 to 15 litres are given for a normal person weighing 150 lbs A Levine tube passed through the nose is sometimes necessary to administer so much fluid Nearly 1 to 2 litres of urine was required to be passed 50 to 100 gms. of proteins in form of amino-acids were also given when tolerated Blood samples were frequently examined for haematocrit index, albumin and globulin ratios, icteric index, sodium chloride creatin and creatinine

All burns were of third degree and 20 p.c. of the body surface was involved Sulphathiazol emulsion was used for dressing

There was only one death among the 17 cases so treated Dr Fox assigns the good results to the balance of sodium and potassium salts in the tissues and also to the amount of fluid retained, the urine passed being not excessive—all these resulting in maintenance of the blood pressure

S B G

# Association Notes

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- 8 N MANGESH RAO—Madras.

## The Annual Conference

The VIth Annual Conference will be held in Lahore towards the end of December 1944. The exact dates will be announced later. Rai Bahadur G D Kapur, M S, F R.C S, 5, Lawrence Road, Lahore, is the Local Secretary and all members intending to attend are requested to get into touch with him as early as possible.

## REGISTRY OF SARCOMA OF BONE

It was decided at the last Conference that a Registry of Sarcoma of Bone is to be maintained under the auspices of the Association. Dr V R Khanolkar of the Tata Memorial Hospital, Bombay, has very kindly consented to make the necessary Pathological study of Specimens. All Surgeons are, therefore, requested to send short but complete notes of cases of Sarcoma of Bones coming under their care to Dr Khanolkar along with X-Ray and Clinical photographs, if any, and a piece of embedded tissue or two unstained slides. It is particularly requested that all Surgeons will co-operate in this endeavour.

### The Library

The attention of all members is invited to the Circular regarding the Library. A separate account has been opened and donations and subscriptions may be sent to the Secretary. Suggestions regarding books and journals to be acquired are welcome. Donations will be acknowledged in the Journal from time to time.

### SUBJECTS FOR DISCUSSION

#### 6th Meeting

##### 1 *Surgery of the Gall Bladder—*

Opener Dr P Chatterjee, Calcutta  
 Seconder Dr H Hyderali Khan, Hyderabad

##### 2 *Carcinoma of the Breast—*

Opener Dr N C Joshi, New Delhi  
 Seconder A Surgeon from Tata Memorial Hospital, Bombay

##### 3 *Urinary Lithiasis—*

Opener Dr L B Joshi, Karachi  
 Seconder Dr H L Vaidya, Kathiawar

#### 7th Meeting

##### 1 *Traumatic Surgery of the Skull—*

Opener Dr R N Cooper, Bombay  
 Seconder Dr G D Kapur, Lahore

##### 2 *Enlarged Prostate—*

Opener Dr S R Moolgavkar, Bombay  
 Seconder Dr S S Anand, Lahore

##### 3 *Fractures of the Neck of the Femur—*

Opener Dr B N Sinha, Lucknow  
 Seconder Dr A K Talwalkar, Bombay

#### 8th Meeting

##### 1 *Carcinoma of the Rectum—*

Opener Dr C P V Menon, Madras  
 Seconder Dr E J Borges, Tata Memorial Hospital, Bombay

##### 2 *Carcinoma of the Cheek—*

Opener Dr B M Joly, Delhi  
 Seconder Dr K M Rai, Madras

##### 3 *Hard Lip and Cleft Palate—*

Opener Dr S C Sinha, Calcutta  
 Seconder Dr M G Kini, Madras

## 9th Meeting

## 1 Bone Tumours—

Opener Dr D R Meher Homji, Bombay

Seconder A Surgeon from Tata Memorial Hospital, Bombay

## 2 Intracranial Tumour—

Opener Dr A. V Baliga, Bombay

Seconder Dr R. N Cooper, Bombay

## 3 Burns—

Opener Dr M R Munawar Ali, Hyderabad

Seconder Dr G M Phadke, Bombay

## Prize Essay

The offer of a prize of Rs 150 for the best Essay on "Infections of the Foot" is renewed. The following are the conditions —

1 The competition is open to all qualified medical practitioners registered in India, who have been in practice for not more than 10 years after qualification

2 The essay should be based on original work and should be written in English

3 It should be type-written on one side of the paper only and should not contain the name or other indication of the identity of the competitor. Four copies should be submitted

4 The name, address and qualifications, however, should be written on a separate sheet of paper and enclosed with the essay

5 The subject is "Infections of the Foot" and the essay should reach the Secretary before the 1st October 1945

6 The copyright for the winning essay will remain with the Association of Surgeons of India and will be published in the Indian Journal of Surgery. Other essays will be returned to the senders, if accompanied by stamped addressed envelopes

7 The Governing Body may, at its discretion, withhold the prize if the essays submitted do not come up to the standard

8 All communications regarding the above are to be addressed to the Secretary, Association of Surgeons of India, 'Binfield,' Kilpauk, Madras

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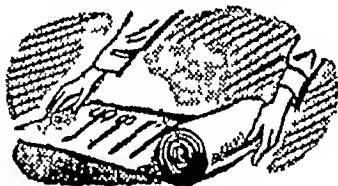
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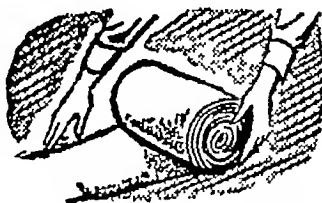
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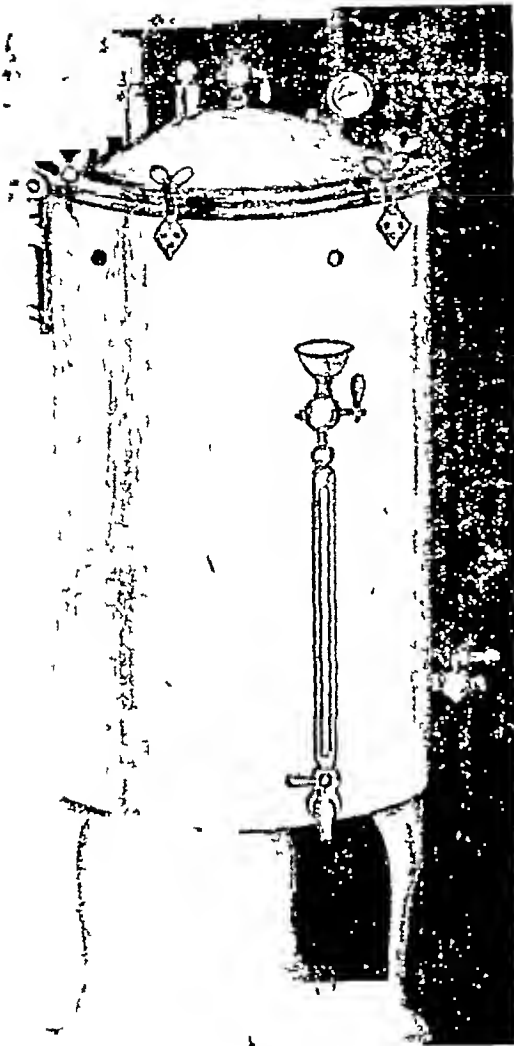
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which was due to unavoidable causes

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### NOTICE TO CONTRIBUTORS

Contributions to be sent to one of the Joint Editors, The Indian Journal of Surgery, S R Moolgavkar, 'Belle Ville,' Gowalia Tank Road, Bombay or C P V Menon, 'Binfield,' Kilpauk, Madras

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# THE INDIAN JOURNAL OF SURGERY

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Nos 3 & 4

अभिन्नमन्त्रं निष्क्रान्तं प्रवेश्य नान्यथा भवेत् ।  
पिपीलिकाशिरोग्रस्तं तदप्येके वदन्ति तु ॥ ५६ ॥  
प्रक्षाल्य पयसा दिग्धं तृणशोणितपांसुभिः ।  
प्रवेशयेत् कृत्तनखो घृतेनाक्तं शनैःशनैः ॥ ५७ ॥  
प्रवेशयेत् क्षीरसिक्तं शुष्कमन्त्रं घृताप्लुतम् ।  
अङ्गुल्याभिमृशेत् कण्ठं जालेनोद्वेजयेदपि ॥ ५८ ॥  
तथान्त्राणि विशन्त्यन्तः स्वां कलां पीडयन्ति च ।  
व्रणाल्पत्वाद्बहुत्वाद्वा दुष्प्रवेशं भवेत्तु यत् ॥ ५९ ॥  
तदापाट्य प्रमाणेन मिषगन्त्रं प्रवेशयेत् ।  
यथास्थन निविष्टे च व्रणं सीव्येदतन्द्रितः ॥ ६० ॥  
स्थानादपेतमादत्ते प्राणान् गुम्फितमेव वा ।  
वेष्टयित्वा तु पट्टेन घृतसेकं प्रदापयेत् ॥ ६१ ॥

SUSHRUTA SAMHITA—CHIKITSA STHANA  
Chapter, II

*Sushruta devotes a special chapter to the treatment of injuries caused by accidents. The above is the procedure adopted when the abdominal wall is punctured as a result of accident or sword-thrust, and a part of the intestines escapes through the opening—*

*The intestines, that have come out, should be pushed in, if uninjured, not otherwise. According to some other acharyas, the injury can be repaired, by bringing the cut edges together and making ants bite over the part, and the intestines then replaced. The surgeon, whose nails should be closely trimmed, first washes the prolapsed portion of the intestines, with water to remove any bits of grass, dust or blood, smears it over with ghee, and pushes gently in. If the bowels have gone dry and shrunk, they should be washed with milk and plenty of ghee applied. Vomiting may be induced by tickling the throat with the*

an orange. The left hip behaves much like the right. The right sacro-iliac symphysis is ankylosed for about an inch."

### Incidence

From the literature it is found that of 79 cases of intrapelvic protrusion of the acetabulum, only 41 cases seem to be true Otto pelvis. This seems rather strange in view of the fact that Gilmour in 1939 reported twelve cases, eight of them personal cases, and one feels that the condition is not so rare as the published statistics would lead us to believe. In a review of 500 radiographs of pathological conditions of the hip taken over a period of five years, in the Sri Krishnarajendra Hospital, Mysore, six cases of typical intrapelvic protrusion were collected. This brings the incidence of the condition to a little over 1% of all pathological hips, a not inconsiderable figure, and it was felt that a detailed description of the condition was justified.

From the literature it is found that the condition is definitely more common in women than in men in the proportion of two to one. It is most common in middle life, the oldest recorded case being in a man of 70 years, and the youngest in a girl of ten years. In 49 of the 79 reported cases, the disease was unilateral and in the other thirty it was bilateral.

In the following six cases there were 3 women and 3 men, and in all of them except one, the disease was unilateral.

### Symptoms and Physical findings

In an average case, the chief complaint is a painful hip joint of slight severity lasting for months or years prior to presenting before the doctor. A limp gradually develops, gait becomes wobbling, and the person finds it difficult to stoop or bend. There is great uneasiness, pain and difficulty in squatting, and, in advanced cases, the patient may hardly be able to walk.

On physical examination there is marked limitation of abduction and external rotation. The greater trochanter may sometimes be felt to grate on the ala of the ilium. Fixed flexion deformity with pelvic rotation and lordosis may be present. Due to the projection of the femur into the pelvis, real shortening occurs. Occasionally the acetabulum and the head of the femur may be felt above the inguinal ligament, and sometimes very readily demonstrated by a rectal or vaginal examination.

### Röntgenography

The diagnosis of intrapelvic protrusion can only be confirmed, and depends in the end, on radiological evidence. Before describing the appearances of a case of protrusion, the X-ray appearances of a normal hip joint needs to be described.

Koehler has described accurately the various characteristic lines in the neighbourhood of the acetabulum. From the radiogram and the key diagram,



Fig 1 Normal hip joint



Fig 1a Line drawing of normal hip showing 'drop tear' figure

the various lines are made out. The roof of the acetabulum in adults is normally prolonged outwards some 2—5 mm in length

"The acetabular cavity is normally projected as a somewhat flattened semi-circle, interrupted in the middle by a depression with a somewhat shorter radius, caused by the deepening of the fossa acetabuli. In addition there are in the depth of the acetabular cavity two other lines, a small curved line, and a very long almost straight line. The three lines form elements of a single complete picture in dorsal photographs of the hip

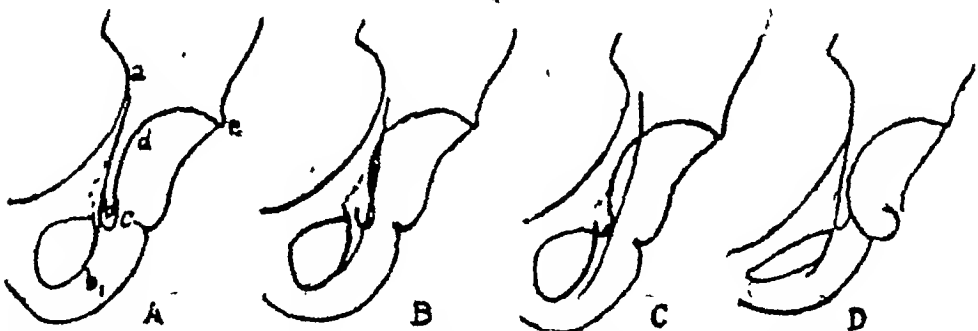


Fig 2. 'Drop tear' figure in various projections (From Koehler's "Roentgenology.")

The resulting figure bears a distant resemblance to a tear, and has therefore been called "tear figure". The lines mentioned change their positions in altered positions of the tube, and partially intersect. In the "tear figure" the arch, c d e is the one easiest made out. It is the contour of the acetabular cavity (It corresponds exactly in every case to the section of the acetabular wall, that would be cut by an imaginary plane at right angles to the tangential rays). The small semi-circular arch b c corresponds to the part of the bone, where the anterior opening of the acetabular fossa curves

round backwards to the wall of the true pelvis, that is, the half cylindrical corticales at and over the posterior obturator tubercle. The third line  $a b b_1$  is the shadow of the wall of the pelvis running in the direction of the rays."

These three lines do not correspond to borders in the pelvis nor to denser lines in the spongiosa, but to the three more or less curved surfaces. If one looks through different roentgenograms of the hip of different persons or of the same person in different projections, one finds the three lines regularly, but their relative positions are very different. For in nearly all the cases, the line  $b c d e$  remains unbroken, while  $a b b_1$  moves nearer to  $c d e$  and can intersect it completely so that the line  $b c d$  comes to be altogether medial to  $a b b_1$ .

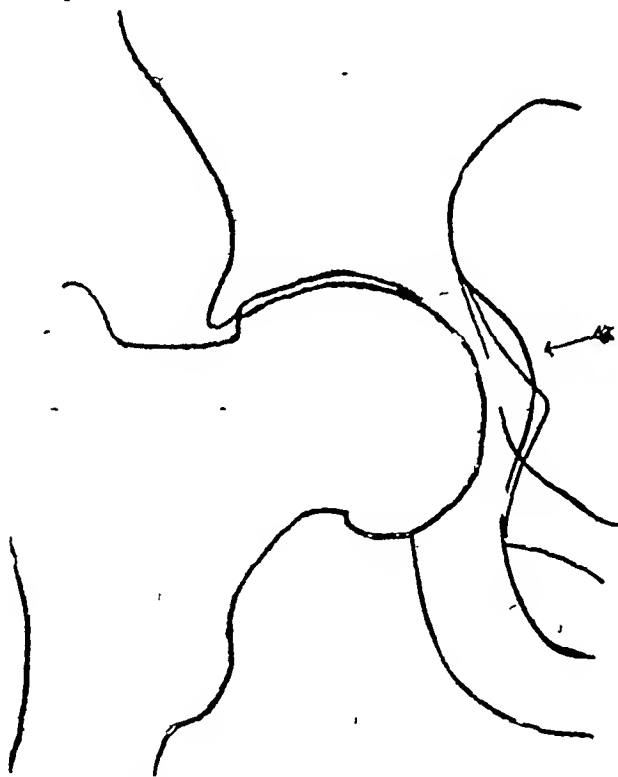


Fig. 3 Line drawing of a case of protrusion. (From Koehler's "Roentgenology")

In each case of protrusion the "tear figure" naturally undergoes corresponding changes. At first the arch of the acetabulum ( $e d c$ ) is changed, in roentgenograms of the whole pelvis it crosses the line  $a b$  of the true pelvis towards the inner side.

The femoral head fits the acetabular cup closely. The joint space is narrowed, but regular. There is no "tear figure," but the curve of Shenton's arc is preserved.

The fundamental changes occur in the acetabulum. The changes in the acetabulum are possible only as long as the head of the femur is more or less

intact, as it should preserve its boring qualities. The degree of protrusion varies from a few millimeters to four or five centimeters in severe cases. As the acetabulum deepens, it is directed upwards, medially and forwards, so that in extreme cases, apart from narrowing the pelvic outlet, the protrusion may be palpated above the inguinal ligament. In advanced cases, the protrusion into the pelvis may cause a narrowing of the pelvic outlet, and may cause obstruction to labour in women. The inner wall of the protruding acetabulum may be thin and shell-like, or layers of new bone may be deposited on the inside producing a dense wall.

As the projection of the femoral head deepens, a low grade osteoplastic process develops, and ultimately osteo-arthritic changes develop in the acetabulum, most marked at its free edge. In a very advanced case, the osteophytes from the head and from the margins of the acetabulum effectually lock the head of the femur in the acetabulum.

The progress of the femoral head into the acetabulum is stopped when the greater trochanter impinges against the pelvis near the shelf of the acetabulum and the lesser trochanter against the ischium. Further progress inwards of the head of the femur is now impossible, and the inner wall of the acetabulum becomes dense and completely ossified. The active stage of the disease ceases, and further changes at the hip are due to the resultant or associated osteoarthritis at the joint. The deformity thus becomes permanent.

### Etiology

There is wide divergence of opinion regarding this disease. From the literature one gets the impression that the overwhelming majority believe that Otto pelvis is not a disease entity, but the end-result of an inflammatory process.

Two broad schools of thought may be classified. Those that believe in the inflammatory theory, and those that believe that it is a developmental anomaly. Chief among the latter school is Eppinger who postulates a growth disturbance of the Y—cartilage of the acetabulum. He called it a chondrodystrophy and regarded it as the primary cause in the production of Otto pelvis. According to him the Y—cartilage persists, and the acetabulum does not fuse, but is projected into the pelvic cavity.

The majority of people have not upheld the view of Eppinger's chondrodystrophy of the acetabular Y—cartilage, but have inclined to the inflammatory cause of the protrusion. While there seems to be a fair degree of unity of opinion about its inflammatory origin, there is wide divergence as to the causative organism.

Numerous bacterial agents have been held responsible, including tubercle bacillus, gonococcus, streptococcus, etc., conditions like tabes, gout,

trauma are among the factors believed to be important from the etiological standpoint

The tuberculous basis of the process has been stressed by Valentin and Mueller. In a large number of cases no such relationship can be made out and the termination of a typical Otto pelvis is very unlike that of tuberculous arthritis.

Several authors have stressed the gonorrheal origin of the condition. In a case of Schlangenhauer in 1909, the gonococcus was found in the hip joint at autopsy. This is the only recorded case where the gonococcus has been demonstrated bacteriologically inside the joint.

Metastatic malignancy as a causative agent in the production of this deformity has been mentioned by several authors. Chiari reported a case who died of carcinoma of the biliary tract. Henschen has collected from the literature seven cases due to Echinococcus infection.

The role of trauma in the causation of Otto Pelvis has caused a great deal of controversy. In some of the cases the trauma has been sustained over 16 years before the onset of symptoms or the recognition of the condition. In a few a combination of trauma and gonococcus has been attributed as the cause.

From the large number and variety of etiological factors attributed to the formation of Otto pelvis, it is obvious that we are far from understanding the cause or the exact underlying pathological processes.

Gilmour in a careful analysis of his cases, came to the conclusion that a pre-protrusion stage exists which he termed as 'deep acetabulum' or 'acetabula profunda,' and in which, later on, protrusion occurs. His view is that the protrusion occurs during the premenstrual period and at a time of greatest growth. The sequence of epiphyseal growth and epiphyseal fusion is disturbed at a time when rapid growth in length of bones and muscular development is taking place, and consequent delay in the fusion of the Y-shaped cartilage. He has demonstrated that where there is unilateral protrusion there is a deep acetabulum on the opposite side, and so the cause of protrusion should be looked for elsewhere than locally in the hip or acetabulum. In support of this view, measurements of the pelves of his series show a relative increase in the intercrystal diameter over the intertrochanteric diameter, and an intertuberosus diameter always less than the normal. In his opinion intrapelvic protrusion is only a part of a general growth disturbance of the whole pelvis.

### Case Reports

Case 1—S—female 29 years of age of moderate build. Married 2 children, both normal labour. In 1934 had fever, with painful nodular swellings in the right groin, for

two days. The fever subsided, but the right hip joint was painful and walking difficult. She was in a plaster of paris cast for 4 months, and was able to walk with some difficulty after its removal. She had a normal labour in 1936, and in 1938 she had a recurrence of pain in the right hip which was relieved by rest. Towards the end of 1940 she had another normal labour.

The present attack started gradually in January 1943 and she noticed that walking was getting more difficult. She sought admission in February 1944 as the pain and difficulty was increasing.

On examination, the right limb is slightly everted, and she walks with a limp on the side. The movements at the hip are markedly limited in all directions, and painful. The muscles of the thigh are wasted, and there is a real shortening of 1.5 cms. No abnormality of the spine.

Blood—uræa, phosphorous and calcium normal. Urinalysis—nothing abnormal, culture—sterile. W.R.—ve. No evidence of gonorrhoeal infection.

#### Roentgenography—

The left hip joint is normal. The right hip joint space is narrowed. The acetabulum projects into the cavity of the pelvis to a depth of 1 cm. There are osteophytic



Fig 4. Case 1.



Fig 4a. Line drawing of right hip.

growths from the margins of the acetabulum. Köhler's 'tear drop' figure is absent on the right side, and well formed on the left. The bone texture is normal on both the sides.

Diagnosis—Intrapelvic protrusion of the right acetabulum with osteo-arthritis of the right hip joint.

Case 2—K. G—male. 26 years of age. In July of 1940 he noticed slight pain in the left hip on walking and limped about for 3 days. The pain increased, and he took to bed and developed fever which lasted for 8 days. The fever subsided and the pain gradually lessened, but there was difficulty in using the left, lower limb. He got massaged without any relief. He was admitted to the Krishnarajendra Hospital in September of 1940 on account of pain in the left hip.

On examination, the left lower limb is flexed and slightly everted. The muscles of the left thigh and gluteal region are wasted, with tilting of the pelvis. All the movements at the hip are impaired and painful. There is apparent lengthening of 2 cms, but there is no real shortening. The spine is normal.

Urinalysis—nothing abnormal. W.R.—negative.

#### *Roentgenography—*

Radiogram of the pelvis and hip taken on 6-9-1940. The joint space of the left hip is diminished and the acetabular margins are fuzzy. The head is well delineated. The



Fig 5 Case 2 on 6-9-1940

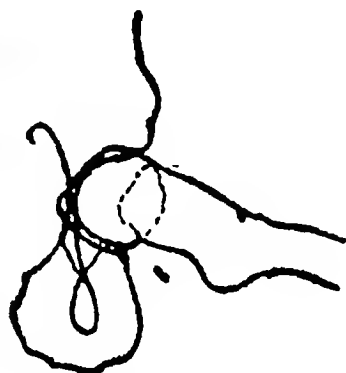


Fig 5a Line drawing of left hip

"tear drop figure" is distorted and the acetabulum projects into the pelvis to the extent of about 4-5 mm. Shenton's line is well preserved on both the sides. There is no evidence of osteoarthritis or decalcification. The right hip appears practically normal, and there is slight crowding of the lines of Köhler, suggesting a tendency towards deep acetabulum.

Diagnosis—Intrapelvic protrusion on the left side with deep acetabulum on the right side.



Fig 6 Case 2 on 18-1-1944



Fig 6a Line drawing of left hip

Another radiogram was taken of the same patient on 18-1-1944, during which time the patient was at home undergoing no treatment, but limping about with the aid of a stick. This radiogram shows slight decalcification on the left side, but the deformity, the narrow joint space, and the fuzziness of the acetabulum remain. Osteo-arthritic changes are present at the rim of the acetabulum, but it is interesting to note that the amount of protrusion of the acetabulum into the pelvic cavity remains the same. The right hip joint does not show any variation from the previous radiogram.

Case 3—K—female 25 years of age. Of short stocky build. Married. In 1932 had a fall from a height of 4 feet and was unconscious for a few minutes and completely recovered. In 1935 was an inpatient in a hospital for "pain in the region of the hip" when she was given rest for a month which completely relieved her. In 1939 was delivered of a still born child.

In 1940 she had fever with pain all over the body. In three days' time the fever subsided and the pain localised itself in the left hip and the pain is persisting. She has difficulty in walking and squatting. Her general condition is good.

Urine—showed pus cells but was sterile on culture. W.R.—negative.

The movements at the hip joint are limited in all directions, and abduction markedly so.

#### Röntgenography—

Radiogram of pelvis and hip joints taken on 18-5-1940. The left hip joint space is practically lost with the contour of the head of the femur intact. The bones show a slight



Fig 7. Case 3



Fig 7a Line drawing of left hip

degree of decalcification. The acetabulum protrudes into the pelvis to the extent of 3 mm. The "tear drop figure" is distorted. There are osteophytic growths from the tip of the acetabulum. The right hip appears normal and Shenton's arc is preserved on both the sides. There is no evidence of any arthritic change in the right hip.

Case 4—K N—male 38 years. Complains of pain in the lumbar region shooting to the back of the thighs of 2½ months' duration. History of transient swelling of the knee joints while young. Had bacillary dysentery in 1942. He is now unable to walk without support, the pain being more marked on the right side than on the left side.

W.R. of blood and C.S.F.—negative repeatedly

*Roentgenography—*

Radlogram shows a marked increase in the depth of both acetabula, more marked on the right than on the left. There is an intrapelvic protrusion of the right acetabulum



Fig 8 Case 4

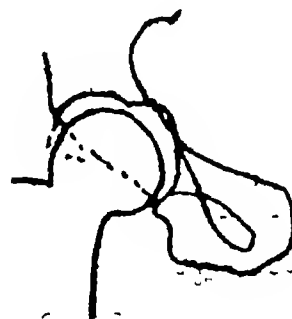


Fig 8a Line drawing of right hip

to a depth of 3 mm. The joint space and the bone texture of both the joints appear normal. Early osteo-arthritic changes are in evidence in the right acetabular margins.

**Case 5—Z—female** 15 years. Unmarried. Three months before admission to the hospital, while travelling in a country cart another person was hurled against her and she got pain in her hips. In a few days she had pain in all the joints of both lower and upper extremities. She had irregular fever when the pain in the joints would flare up.

The patient is of moderate build. The movement at the hips are slightly painful, but not limited. No other abnormality either in the hips or in other joints could be detected.

Heart sounds are accentuated and extra systoles are present.

Urinalysis showed no abnormality.

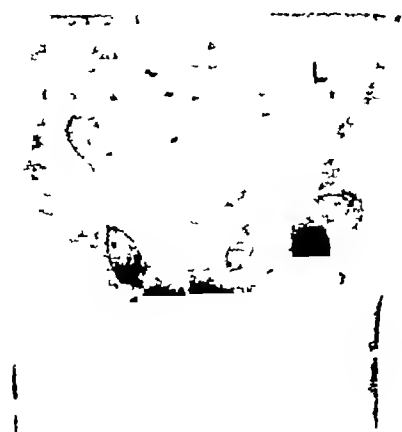


Fig 9, Case 5,



Fig 9a Line drawing of left hip

*Roentgenography—*

Both acetabula are wider than normal. The "drop tear figure" is distorted and there is a mild degree of intrapelvic protrusion of both acetabula. The supra femoral lip of the acetabulum is beak shaped, enhancing the depth of the acetabulum. The joint space cannot be made out definitely. The head of the femur is deformed, flattened with fuzzy margins. There is slipping of the head in relation to the neck (slipped epiphysis?). The trabeculae of the head and neck are very delicate, and there is general atrophy and decalcification of the bones.

Diagnosis—Bilateral intrapelvic protrusion—with slipped epiphysis—and probable epiphysitis of toxic origin.

Case 6—L—female. No history of the case available.

*Roentgenography—*

Shows absence of the "tear drop figure" on the left side, and a fairly well pre-



Fig 10 Case 6

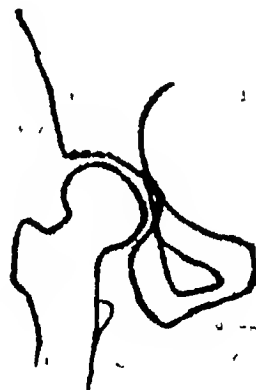


Fig 10a. Line drawing of right hip

served, though slightly distorted figure on the right side. The left joint space is diminished, and the bones appear normal.

Diagnosis—Unilateral deep acetabulum.

**Comment**

From the above six cases reported, there is an equal distribution amongst both the sexes. In all our cases definite diagnosis was possible only after roentgenological examination, though in Case 1, it was suspected on account of the insidious onset of the disease and the good general condition of the patient.

In all the cases except Case 6, where no history was available, there is a history of fever in direct relationship with the joint disability. This suggests that the cause for intrapelvic protrusion may be inflammatory, either bacterial or toxic.

Gilmour's view that the condition is practically always bilateral does not accord with our observations. Except in Case 5, where there are manifest changes in the head and neck of the femur unlike the other cases, the condition is unilateral. In the female patients, the pelvimetric measurements are within normal limits and do not show any reversal in the intercrystal and intertrochanteric diameters, nor a diminution in the intertuberous diameter.

Trauma as a definite etiological factor cannot be substantiated. Except in cases 3 and 5 there is no definite history of trauma. In no case could a history of gonorrhoea be obtained, nor could the gonococcus be demonstrated in the urogenital tract. It is possible that these arthritides are due to absorption of toxins from some septic focus, and the localisation of the lesion is probably brought about by trauma, in some cases the trauma being too insignificant to be remembered or to be associated with this condition.

Radiograms taken after an interval of 3—4 years as in case 2 show that there is no progress in the protrusion, though the trochanter has not come into contact with the ileum. This finding is not in accordance with the view held by others.

### Treatment

A rational treatment obviously is not possible as the etiology and pathology is still obscure. Smith-Petersen has performed, successfully, "acetabuloplasty," and prevented further protrusion of the acetabulum and head of the femur. In most cases, however, it appears as if the associated osteoarthritis is the disabling cause and not the protrusion per se.

The treatment would then be for osteo-arthritis of the hip.

### Summary

(1) The condition of intrapelvic protrusion of the acetabulum is described with its radiological features.

(2) Six cases have been reported.

(3) It is observed that this condition is more probably inflammatory in origin than a developmental anomaly.

### Acknowledgements

My thanks are due to Dr C Krishnaswami Rau, Medical Officer, Sri Krishnarajendra Hospital, and Principal, University Medical College, Mysore, for kind permission to publish this paper and to Dr A C Devaraj, Radiologist, Krishnarajendra Hospital, for the roentgenograms.

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# CANCER OF THE ESOPHAGUS

(A review of 153 cases)

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Among the malignant diseases perhaps the deadliest is cancer of the esophagus. The very protected and deep situation of the organ is an impediment to the application of surgical and radiological methods which have proved successful in the treatment of cancer in other situations. Radiation can at best produce palliative results and surgery is attended with a high mortality. Since the inception of this hospital we have been faced with this problem so frequently that it may be instructive to review the methods of study and treatment we have used. From March 1941 to December 1942 there have been 153 patients with this disease. This paper is a review based on a study of these cases.

## Incidence

In this same period we have had 5,000 admissions to the clinic. Of these 3,200 suffered from malignant disease. This gives 4.8% as the percentage of cancer of the esophagus. This figure does not by any means represent the true incidence in relation to other malignant diseases in this country, because at this hospital we must expect to see a higher proportion of cancers whose treatment is mainly radiological, as those amenable to surgery only trickle in after selective filtration through the surgical departments of general hospitals. At the Memorial Hospital, New York, the incidence is 2.5% of all malignant disease (Pack & LeFevre). In London Soutter<sup>1</sup> reports an incidence of 5% of all cancers. These figures and the fact that we here have seen 153 cases in 20 months show that cancer of the esophagus is not as uncommon as one is apt to think.

TABLE I AGE INCIDENCE

30 to 39 years	19 Cases	70 and over	2 Cases
40 to 49 "	47 "	Youngest patients	2 Cases of 31 years
50 to 59 "	61 "	Oldest patient	74 years
60 to 69 "	24 "		

Table I shows the age distribution of the disease. The maximum figures appear in the 5th and 6th decades. Though this is predominantly a disease of later life it must be noted that two of our patients were only 31 years old, both were treated elsewhere for spasm because of their youth.

As regards the sex of the patient, some unknown factor which also seems to operate in all cancers of the mouth and throat, makes the male more prone to this disease. Among our cases there were 124 men and 29 women, the lesion being about four times more common in males.

TABLE II. COMMUNITY INCIDENCE

HINDOOS.	104
Gujarathis	53
Deccanis	39
Others	12
MUSLIMS	32
Bombay	12
Gujarath	4
Khoja & Bori	5
Others	11
CHRISTIANS	13
PARSIS	3
EUROPEAN.	1

Table II shows the incidence in the various communities that visit this clinic. One immediately notices the high figures among the Gujarathis, 53 out of 153, constituting one-third of the whole series. This predominance is not due to a larger attendance of Gujarathis at this hospital as the relative attendance of Gujarathi and Deccani Hindoos is about the same. We have also noticed this pre-disposition of the Gujarathi community to oro-pharyngeal cancer in our other statistical studies, and investigations are in progress to determine what factors if any are responsible for this curious distribution.

A study of the local etiological factors is not very helpful. The percentage of patients with positive Kahn tests was 10%, which is just a little higher than 6 per cent, the percentage of positive reports we obtained among our unselected blood donors in the course of the last year. Syphilis is therefore not an important factor. Dental sepsis is frequent in these patients, but a few had excellent teeth or had them removed years before. Vegetarians and non-vegetarians are equally affected. From all this it appears that extraneous local factors are perhaps not so important in the etiology, though most observers are inclined to believe that repeated irritation of the gullet by hot or pungent food, or by coarse and unchewed food, has something to do with it.

### Clinical Features

The first and main symptom in almost all the cases is some difficulty in swallowing. At the onset it may be a trivial discomfort which may not worry the patient at all until in a few months the dysphagia is severe enough to make him seek medical advice.

TABLE III SYMPTOMS AND THEIR DURATION  
FIRST SYMPTOM

Dysphagia	...	141
Pain	..	8
Pain & dysphagia	.	2
Hoarse voice		1
Debility	..	1

## DURATION

Under 3 months	.	55
3 to 6 "	..	30
6 to 12 "		37
Over 1 year		11

Minimum duration 2 weeks

Maximum " 4 years

Table III shows that dysphagia is the most common first indication of the disease. Only a few cases had pain and only one had hoarseness as the primary complaint. This disease, though usually so simple to diagnose, occasionally deceives even the most competent physicians and therefore a mention of a few of the mistakes that have come our way will not be out of place. Both the young men of 31 were treated for esophageal spasm before being referred to us because cancer at that age was ruled out. Age should therefore not be considered at all. Carcinoma has so often masqueraded under the guise of cardiospasm and the Plummer-Vinson syndrome that we would urge endoscopic examination in all these cases. Eight such patients have come to us. Then again, apart from the one case included in this series, we have recently come across two others whose first symptom was a hoarse voice. In both these patients the diagnosis was missed by competent laryngologists because they did not complain of dysphagia until some months later. We have made it a rule in a patient who complains of throat symptoms to have a fluoroscopic examination of the oesophagus if nothing to account for the symptoms is seen in the throat. We have been rewarded in two cases by the discovery of an unsuspected lesion of the esophagus.

In over two-thirds of the cases as seen in Table III the symptoms were present for more than 3 months before the patients came for treatment. The great majority of patients come to us so late that we should like every medical practitioner to realise that the early symptoms are absent or trivial, so that a patient with any symptoms referable to the act of deglutition, who is over the age of 30, should be sent to a clinic where adequate X-ray and esophagoscopy facilities are available. Only thus could patients be caught early.

Every patient sent to us with symptoms referred to the act of deglutition is subjected to, besides the usual routine, three methods of examination. A careful mirror scrutiny of the pharynx and larynx, fluoroscopy of the chest

before and after a Barium swallow, and esophagoscopy. The latter two are omitted if definite disease responsible for the symptoms is found in the throat. It is particularly important to exclude aneurysm and other extra-esophageal conditions before attempting endoscopy, and a skiagram after a Barium swallow is of help in indicating the site where a tumour is to be expected. By using a thick emulsion and taking pictures in more than one position it is possible to get an accurate idea of the extent and nature of the lesion. But it must be understood that esophagoscopy is the only method that will detect the very earliest lesion, and also differentiate the malignant from other strictures.

We do all esophagoscopic examinations with local anaesthesia. Pre-medication with morphine gr 1/6 and atropine gr 1/150 is given one hour before. A spray of Percaine 1 per cent into the throat and wiping the lower reaches of the pharynx with a swab of Percaine held with a curved forceps is sufficient in most cases. In a nervous individual or an in-cooperative patient it has been occasionally necessary to use general anaesthesia.

In the 153 cases under review esophagoscopy was done in 99. In the rest either the patient did not return for the examination or refused it. A biopsy was taken in every case in which a tumour or ulcer was seen. A positive biopsy was obtained in 83 cases. A definite case of cancer may sometimes yield a repeatedly negative biopsy. In the scirrhus type of lesion where the tumour infiltrates deeply, the mucous membrane above the growth is often edematous and puckered, obstructing the passage of the instrument right up to the tumour, a biopsy at the strictured site therefore occasionally yields innocent tissue. Therefore when X-ray evidence has been conclusive about the diagnosis and no purely inflammatory lesion is suspected, one treats the case as cancer.

The findings on esophagoscopy vary with the nature of the tumour. In the scirrhus type of growth all that is usually seen is a narrowing of the lumen with thickened, puckered mucous membrane around. The polypoid type of cancer tends to spread in the submucosa and is seen as an elevation obscuring the lumen covered frequently by normal looking mucosa. In the ulcerative lesion what meets the eye is a raw bleeding surface with a raised edge often covered with slough or decomposing food particles. In some early lesions the only evidence of disease may be a stiffening of the wall of the tube which affects its normal respiratory excursions. In one patient (case No 3314) fluoroscopic studies with Barium for symptoms of mild dysphagia revealed no constriction or irregularity of any kind. On esophagoscopy it was found that a segment of the anterior wall of the tube 22 cms from the incisor teeth did not move well with the respirations though there was no narrowing and the instrument could pass easily. A slightly roughened area on this anterior wall was biopsied to reveal an epidermoid carcinoma grade 2.

This patient was diagnosed early and treated with radium and is alive and well to-day over one year from the date of treatment. This case illustrates the value of endoscopy in early cases as radiological examination had missed the tumour and the patient might have been assured that she had no cancer and valuable time might have been lost before the diagnosis was later made clear. Whenever a lesion is visualised it is wise to biopsy it. This not only confirms the diagnosis, but yields information about the histology of the tumour that is of great help in planning out the best treatment. Also occasionally, one does come across a purely inflammatory stricture as occurred in case No 2513, a patient who had bilateral pulmonary tuberculosis and an esophageal stricture which repeatedly yielded chronic inflammatory tissue on biopsy; it is more than probable that this patient had a tuberculous stricture.

Clinically, we visualise three types of lesions as identified by their X-ray and endoscopic appearances (A) Scirrhus, (B) Polypoid and (C) Ulcerative. We like to separate them into these types as we try to be guided in the line of treatment by the type of case we are dealing with.

An X-ray study of these lesions reveals several interesting features about the disease which are tabulated below —

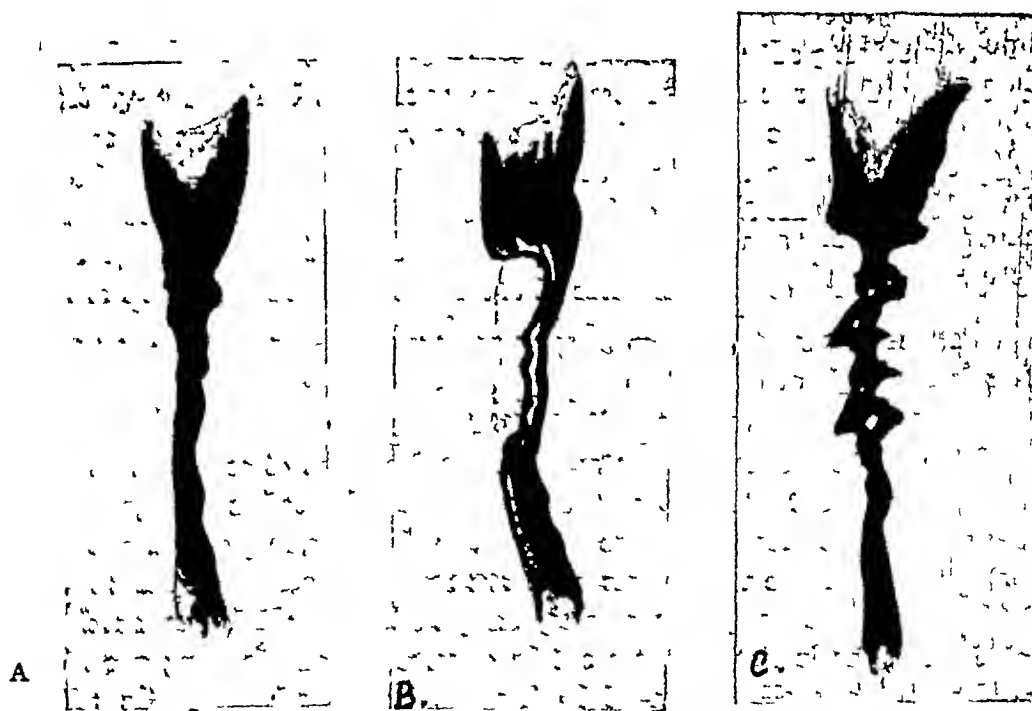


Fig 1. Shows the three types of lesions as visualised clinically

- A. Barium column as seen on the skiagram in the scirrhus type.
- B. The same in the polypoid type.
- C. The same in the ulcerative type.

# LOCATION OF THE TUMOUR.—In 126 patients carefully studied —

I	Above the bifurcation of the trachea	26
	Above the clavicle	8
	Below the „	18
II.	At the bifurcation of the trachea	31
III	Below the bifurcation of the trachea	69.
	Above the diaphragm	55
	At the cardia	14

It is seen that the majority of lesions occur below the bifurcation of the trachea and at this level. The upper and lower ends of the oesophagus were affected in 8 and 14 cases respectively.

## THE TYPE OF TUMOUR —Where this could be clearly identified on the skiagram

Scirrhus 40,                      Ulcerative 27,                      Polypoid 38.

## AVERAGE LENGTH OF LESION, as judged from X-ray studies.

Scirrhus 4.5 cm.                      Ulcerative 5.0 cm,                      Polypoid 7.0 cm.

This shows that the polypoid tumours tend to be more widely spread along the tube than the others and this is brought about by a submucous spread which is particularly prone to occur in this type of lesion.

## DEGREE OF OBSTRUCTION

## DEGREE OF DILATATION

Slight	47	Nil	22
Moderate	49	Slight	60
Almost complete	9	Marked	23

## Pathology

Pathological specimens obtained at operation or at post-mortem conform to the three types that we see clinically. There is the stenosing scirrhus lesion which may extend over a small vertical segment of the tube, there is the flat infiltrating ulcer which may encircle the tube, and there is the polypoid growth that tends to grow into the lumen rather than through the wall and so often produces symptoms at an earlier stage of the disease. In the former two the tumour has frequently infiltrated through and outside the muscular wall when the symptoms first appear. The absence of a serous coat and the thin musculature of the tube are mainly responsible for the early penetration of the growth into the mediastinum. This makes it imperative that a radical surgical attack if it is going to have any chance of success should be early.

Distant dissemination is not commonly met with. Most patients succumb before the disease has spread very far. The chronic malnutrition asso-

ciated with esophageal obstruction appears to undermine the patient's strength and resistance to intercurrent infections which carry him off before the cancer has had time to spread widely. In our series the lymph nodes frequently seen involved were those in the posterior mediastinum and those in the vicinity of the left gastric artery. This important lymph drainage from the lower half of the esophagus to the left coronary gastric group of lymph nodes, has to be remembered in radical operations on the organ for cancer. Involvement of cervical nodes occurs in a small percentage of cases. The liver is rarely involved and then usually from gastric lesions involving the esophagus.

Histologically, most of the tumours are of the squamous cell and epidermoid type and a few are adenocarcinomata. The Table below illustrates this.—

TABLE OF HISTOLOGICAL FEATURES

Squamous Carcinoma grade I	2
Squamous Carcinoma grade II	26
Epidermoid Carcinoma grade II	33
Epidermoid Carcinoma grade III	11
Adeno-carcinoma	2

It must be remembered that the esophagus is lined in the greater part of its extent by a stratified squamous epithelium. As one approaches the lower end, the lining gradually takes on the character of that of the gastric mucosa. The change is not abrupt and especially at the lower end the two types of epithelium dove-tail into each other. Therefore, whilst almost all the cancers of the upper part of the tube are squamous, some of the cancers of the lower end are adeno-carcinomata, so that it is often difficult to know whether the tumour originated in the stomach or at the lower end of the esophagus.

### Treatment

A reference to the results of the treatment of cancer of the esophagus with X-rays or radium reported from clinics all over the world and our own experience recorded below soon convince one that the results are far from satisfactory. There are only a very few cases on record that have been cured by radiation. The great majority of these patients die within one year of the appearance of the symptom or about from 6 to 8 months after the diagnosis. Watson<sup>2</sup> of Memorial Hospital, New York, reports 666 cases treated with X-rays at that hospital which deals only with neoplastic disease. Of these only 2 patients lived for more than two years and only 8 patients more than one year after the beginning of treatment. This sorry state of affairs has encouraged surgeons in recent years to tackle the problem on radical surgical lines. The first successful esophagectomy was

performed by Torek<sup>3</sup> of New York in 1913 on a woman of 67 years who subsequently lived for 13 years and died from pneumonia<sup>4</sup>. At post-mortem no trace of the old cancer was found. Since that time several successful resections have been done by surgeons all over the world. Till 1941 there have been reported in the world literature<sup>5</sup> 86 patients surviving the radical operation. Among these there are 10 who have lived for more than 5 years and 2 who have lived for more than 3 years. Garlock of New York reports 17 cases with a mortality of 27 per cent. Although these results are encouraging, the formidable nature of the operation and the high mortality attending on it raises the question whether it is a justifiable and worthwhile procedure. We have already pointed out that almost a 100 per cent of the patients treated with radiation die within a year. If, however, the early favourable cases are treated by surgical excision about 70 per cent of these would survive the operation, and of these at least 15 per cent would live for three years and over, a distinct improvement on present conditions. We must also remember that as esophagectomy becomes a more frequently attempted operation, the technique and mortality will improve, and better results obtained. One hesitates to advocate such a heroic operation in preference to radiation methods, but present results certainly justify it. One still feels, however, that the future of cancer of the esophagus must rest in the hands of the radiologist who should be able to evolve a technique which will give improved results. Until such time we believe that early cases that are willing to take the risk should be given a chance with surgery and those not inclined for the gamble subjected to improved methods of radiation technique. The greatest objection raised against operation is that the mortality is high and some patients who might have lived for some time are suddenly cut off. But this objection does not take account of the fact that the short period of life left to the patient is not particularly happy. Most of them have to have a gastrostomy for feeds, they cannot enjoy a meal, there is usually pain in the chest, and salivation, and foul breath from decomposing food mixed with discharge from the ulcer held up above the stricture, only a few of them have a comfortable time for a few months, almost all of them get worse and die in about from six to eight months. If the patient and his relatives would only realise how trying after all, these few months of life snatched from death could be, they would not consider surgery such a bad gamble at all.

As we have said before only a selected few should have a radical operation offered to them. In this selection we have adopted the following criteria

- (1) With a short history of symptoms the chances of the lesion having spread beyond the limits of the tube are less and so patients with a history of over 3 months are considered not favourable though they are not excluded only on this account.

(2) A thorough examination should reveal no evidence of metastases. At the preliminary laparotomy to establish a gastrostomy or jejunostomy that is always done, a careful palpation of the liver, stomach, terminal esophagus, lymph nodes along the lesser curvature and the pre-aortic nodes is carried out. Any lesion in these situations excludes the patient from radical surgery.

(3) The presence of a deep seated boring pain is interpreted as meaning extension of the disease into the mediastinum and is a contraindication for operation.

(4) Persistent fever is also indicative of mediastinal invasion and infection.

(5) The site of the lesion also influences the treatment. A growth at the lower end lends itself conveniently to a resection with preservation of continuity by a gastro-esophageal anastomosis. Apart from this, lower end lesions have been found to be comparatively radio-resistant perhaps because the viscera below the diaphragm interfere with adequate radiation, and partly because some of these lesions are the less radio-sensitive adeno-carcinoma. Disease at the aortic arch we treat with more surgical respect, as here there is apt to be difficulty with adhesions to very important structures and unless all the other factors are very favourable for an operation, we prefer to turn these patients over to the radiologist. Lesions above the aortic arch are not satisfactorily handled by surgery, because excision of that segment of the esophagus leaves too small a part of the tube for bringing out at the lower part of the neck. Lesions at the upper end of the gullet are more accessible to the X-rays and are perhaps better treated by radiation. The alternative of surgery involves a total laryngectomy as well, and plastic procedures to construct a cervical esophagus to bridge the gap in the neck.

(6) The nature of the lesion is also to be considered. Polypoid tumours tend to spread submucously and are therefore often seen early before any penetration through the muscle coat has occurred, and so are more favourable for resection than the scirrhus or ulcerative types. It is our routine to esophagoscope our patients and obtain a biopsy and if the histology shows a carcinoma of the higher grades 3 or 4, it is wiser to treat these with radiation as these are more radio-sensitive and are also more apt to disseminate early.

(7) The patient should be in fair general health, with a normal cardiovascular, renal and pulmonary apparatus. Unfortunately the majority of these patients are under-nourished and in poor health. However, we do not exclude patients merely on the fact of their being thin and emaciated as we have time and again been surprised to see how well these stand the operation, given expert anaesthesia, good team work in the theatre, sufficient blood

and plasma transfusions and meticulous attention to pre- and post-operative care

## RADICAL SURGERY

Patients who satisfy the above criteria are prepared for exploration and resection. Briefly, oral sepsis is attended to and protein, chloride and vitamin and water deficiencies corrected by intravenous plasma and saline transfusions and injections of vitamin C. The sugar reserve is built up by adding extra sugar to the diet. Two types of operations have now to be considered: resection and esophago-gastrostomy, and resection with bringing out of the upper segment at the neck.

*Resection and Esophago-gastrostomy*—This is only possible in a lesion situated in the lower fourth, the upper limit being well below the root of the lung. In our experience there has been so much difficulty with the proximal segment, which retracts to an amazing extent, that we would hesitate to attempt an anastomotic procedure if the tumour were more than about 5 cms above the diaphragmatic hiatus. In the average sized Indian we do not think it would be possible to effect a satisfactory anastomosis if the upper limit of the growth is less than 30 cms from the upper incisor teeth as measured through the esophagoscope. When it is thought that an anastomosis is possible we prefer to establish a jejunostomy after the preliminary laparotomy. This is a great help in building up the patient for the second stage and also in maintaining nutrition during the early days of the second convalescence. A gastrostomy of course is avoided because it would interfere with the mobilisation of the stomach into the thorax at the major operation. Garlock sometimes dispenses with the jejunostomy preferring to feed his patient through a nasal feeding tube passed beyond the anastomosis. But we feel happier with the jejunostomy. At this first stage a careful inspection of the stomach, liver and adjacent nodes is made. If metastases are found the operation is concluded with a gastrostomy, and the patient treated by radiation.

The technique of the second stage will only briefly be indicated. The operation is begun as an exploratory thoracotomy and only if the growth is operable is the resection done. Esophagectomy is an operation that requires the assistance of an expert anaesthetist familiar with intrathoracic work. Our anaesthetist Dr. B. N. Sircar has acquired considerable experience of these operations. The technique he uses is intra-tracheal inhalation anaesthesia with ether or cyclo-propane with controlled respiration. The esophagus is approached transpleurally through the bed of the 8th rib which is resected up to almost the transverse process of the corresponding vertebra. We have so far never found it necessary to cut through any of the adjacent ribs to improve the exposure. The anaesthetist allows the lung to collapse and the latter is gently pushed out of the way with the assistant's hand to expose the lower part of the aorta and the diaphragm. Manual retraction is preferable to the use of any retractor because the assistant can avoid undue

pressure on the heart. The esophagus is exposed by incising the mediastinal pleura in front of the aorta and the tumour inspected. In the presence of metastatic nodes or infiltration of the aorta or the adjacent mediastinum, the operation is given up and the thorax closed. If conditions are favourable, by careful finger dissection, the diseased segment is freed from its bed and the esophagus mobilised for about two inches above the growth. The diaphragm is then incised radially forwards from the hiatus and the stomach and spleen brought into view. The latter is held out of the way and the upper part of the stomach mobilised by dividing the short gastric vessels and the left gastric artery with their associated omenta. Particular care is taken to remove any nodes about the left gastric artery which is best tied at its origin. The stomach is then divided between clamps so that as much of the greater curvature as possible is preserved. The distal segment is sutured in two layers and kept ready for the anastomosis. It is better to complete all these steps first in order to minimise the time during which contamination of the pleural cavity may occur after section of the esophagus. The latter is then cut through at least one inch above the palpable upper limit of the tumour using no crushing clamps that damage the vascularity of the esophageal stump. The anastomosis is the most important step of the operation and must be meticulously done. The esophagus is implanted into an opening made into the anterior surface of the stomach at its highest part. A posterior layer of interrupted cotton sutures is placed to anchor the serosa of the stomach to the muscularis of the esophagus, a continuous catgut suture unites the mucosae, and an anterior interrupted cotton completes the anastomosis. Difficulty here is always caused by the retraction of the upper segment and after the anastomosis it is necessary to anchor the stomach to the pulmonary ligament and the adjacent pleura, to relieve tension on the suture line. The diaphragmatic incision is closed about the stomach with two or three sutures anchoring the latter to the former. A large drainage tube is then placed through a stab at the most posterior and dependent part of the pleural cavity and clamped. The thorax is then closed in layers taking special care to see that all air is expelled from the cavity by the anaesthetist inflating the lung fully before the last pleural stitch.

*Resection and cervical Esophagostomy*—This operation is done in all cases of thoracic growths where the previously described procedure is not possible. A laparotomy is done as a first stage and the usual inspection for metastases carried out. Whatever the outcome of this exploration a gastrotomy is done. The second stage is undertaken a fortnight later only if the abdomen has been found clear of disease. The anaesthesia and position remain the same as described previously. The incision, however, is placed through the bed of the 7th rib and in one case it was found necessary to cut the posterior ends of the next two higher ribs to improve the exposure. After deciding that the condition is operable the tumour is mobilised with finger

dissection following incision of the mediastinal pleura in front of the aorta. It is also necessary to incise the pleura above the arch and to mobilise the esophagus from above. When the mobilisation is complete the esophagus is severed about an inch above the diaphragm and the lower segment inverted into the stomach. The stump of the upper segment is covered with a rubber envelope to prevent contamination, and the whole pushed up into the neck. This step is facilitated if the lower part of the cervical esophagus is freed from its bed by the finger working from the mediastinum. In this operation the greatest difficulty is met with from adhesions to the aorta and the opposite pleura and in four of our cases the latter was opened without any serious consequences however. A few twigs from the aorta to the esophagus have also to be tied but we have not so far experienced any trouble from severe haemorrhage. The thorax is closed as described before and the patient turned over on to his back. An incision in front of the sterno-mastoid soon exposes the cervical esophagus and delivers the stump at the neck. The tumour is then cut off leaving a stump just sufficient to reach below the clavicle. This stump is then passed through a subcutaneous channel over the clavicle and allowed to open on the chest, where a few sutures anchor it to the skin. After a few weeks this stoma may be connected with the gastric stoma by a rubber tube so that the patient is enabled to take liquid food by mouth. At a much later date the connecting rubber tube can be replaced by a plastic skin tube, but so far we have had no opportunity to do so.

The number of esophagectomies that can be done in a year are very few, not only because the cases that are suitable are scarce but also because, to obtain consent for such a formidable operation the risks of which have to be explained to the patient's relatives, calls for eloquence and salesmanship of the highest order. We were able to achieve this happy combination on 16 separate occasions, so that we are able to report 8 esophageal resections and 8 exploratory thoracotomies.

#### TABLE IV. SUMMARY OF CASES TREATED BY RADICAL SURGERY

##### I Esophagectomy.—

##### (a) Resection & Esophago-gastrostomy 4 Cases

3 patients died in the post-operative period

1 patient survived for 10 months after operation, was quite well for 8 months but developed a stricture with recurrence and died (case No. 2321)—See Fig. 2

##### (b) Resection & cervical Esophagostomy. 4 Cases

3 patients died in the post operative period.

1 patient survived 2 months but unfortunately was attacked with amoebic dysentery which

could not be controlled and led to his death.  
(Case No 2450)

## II Exploratory Thoracotomy •

8 Cases

5 patients survived and were later treated with X-rays, all of them succumbed within one year.

3 patients died in the post operative period, in these three an attempt at resection was made but given up after partial mobilisation of the esophagus or stomach.

As will be seen from Table IV our experience of radical surgery of the esophagus has been small. The results have not been particularly happy, but nevertheless the experience has been instructive. Of the successfully resected cases only two have survived. The others died post-operatively. Two died from shock. One died on the 7th day suddenly after a remarkably easy convalescence from sudden pneumothorax immediately after removal of the drainage tube. Two died from pneumonia and one from empyema on the 11th day. From the causes of post-operative death recorded above it will be seen that some of these fatalities could or might have been prevented and as one's experience increases one hopes to lose fewer cases, by improving technique and eliminating morbid factors.



Fig 2 Skiagram of case No 2321 after resection and esophago-gastrostomy showing stomach and anastomosis in the thorax. There is an anastomotic stricture. Picture taken 8 months after operation.

TABLE V. SUMMARY OF THE 153 CASES SEEN AT THIS CLINIC

X-ray treatment	..	39
Radium treatment	.	8
Radical surgery	.	8
Died after exploration	..	3
Did not return for treatment or took treatment for few days		48
Too far advanced for radiation		47
		<hr/> 153 <hr/>

### Management of patients not suitable for radical surgery

As has been said before only a few patients can be considered suitable for radical surgery. Therefore esophagectomy has practically a very small though definite place in the treatment. Most patients have to be treated palliatively with or without radiation. The first thing to decide is whether the patient should have any radiation at all. It often happens that the patient is so feeble that radiation would only hasten his end, and so such a one, or one with very extensive disease is only advised a palliative gastrostomy and his strength is maintained with a nutritious liquid diet, vitamins, liver extract and iron.

If the patient is fit for radiation we next decide whether he will need a preliminary gastrostomy. An individual who swallows even liquids with great difficulty requires a gastrostomy as the first step. A less obstructed person raises the question whether he should be carried through the period of radiotherapy without any preliminary procedures or whether his nutrition should be improved by a gastrostomy or dilatation of the stricture. It is our practice to try dilatation in the schirrhous lesion of short extent. The polypoid growth tends to bleed and the ulcerative lesion runs the risk of perforation if dilatation is attempted. A patient who may go along very well without any additional procedure is one with a polypoid tumour which sometimes shrinks sufficiently during radiation to relieve obstruction to a remarkable degree. The ulcerative type does best with a gastrostomy as the ulcer is kept at rest and secondary infection largely prevented by oral abstinence. We have carried a number of patients through radiation without a gastrostomy, but in many of these we have been compelled to perform it at some time or other because of return of obstruction usually from recurrence and in a few cases from post-radiational fibrosis.

*Gastrostomy*—Most of the patients that need this operation are half-starved and dehydrated individuals and intravenous fluids to restore the water

and electrolyte balance, and vitamin C to promote wound healing are important pre-operative measures. We prefer in these cases a muco-cutaneous type of gastrostomy made by fashioning a goose-neck tube from the stomach wall and bringing it out through the abdominal wound so that mucosa and skin may unite. The advantage of this type of fistula is that it does not contract or close, and so permits the leaving out of the rubber tube except at feeding. The problem and technique of gastrostomy in cancer of the esophagus will be discussed separately by Dr J C Paymaster at some length, so they will not be considered in this paper.

*Dilatation*—In the scirrhous type of lesion where the patient is not acutely starving it is often possible to keep the stricture sufficiently patent with repeated dilatation during and after the course of radiation. The only indication for this is that patients prefer a procedure that permits them to chew and swallow food. We have used three methods in our cases.

(a) Dilatation through the esophagoscope under direct vision done at weekly intervals. Flexible tapering bougies of increasing sizes are passed through the stricture with care. This method besides subjecting the patient to an irksome procedure like esophagoscopy is also a little dangerous as the eye can only follow the bougie through the upper end of the stricture and cannot trace its further course which may occasionally be through friable tumour tissue into the mediastinum. We have therefore used this method rarely and only for post-radiational stricture.

(b) Passing dilators guided over a string previously swallowed is safer and less trying to the patient. The evening previous to the dilatation the patient is given 12 feet of string to swallow very slowly at the rate of about a foot an hour. This allows a large portion of the string to pass into the small gut and obtain firm anchorage there. The dilatation is performed by threading a series of graded metal olives screwed on the end of a flexible rod, one at a time, and passing them down the thread held taut with the other hand. In this way the dilator is made to follow the string in its devious track through the stricture. The passage is usually dilated to about 10 mm just enough to permit swallowing with a fair amount of ease. We have usually used this method in our cases.

(c) Retrograde dilatation is done after a preliminary gastrostomy. The patient swallows a string with a small bead attached to its end. Through an endoscope passed through the gastric fistula the string is picked by a forceps. A series of graded rubber dilators are then attached to the string and pulled through the stricture from the mouth to give the required dilatation. This method is useful where dilatation over a string is not possible for any reason and where a patient already has a gastrostomy but wishes to have food by mouth. We have had occasion to use this method only once.

*Deep X-ray therapy*—Most of our patients have been treated by X-rays with the following factors: 200 KV, 50 cm TSD, 15 ma,  $\frac{1}{2}$  mm Cu, 1 mm Al. Multiple ports of entry are used so that a large tumour dose may be given while the tissue dose to each segment of skin and lung is small enough to cause no damage. It is our practice to use 6 ports, 3 anterior and 3 posterior, each 3 cm in width, the vertical measurement being determined by the extent of the disease. The patient receives treatment daily through one or two of the ports in rotation. About 200 or 300 roentgens are delivered to each port and the total dose carried to 1800 r or 2400 r per port if the patient can stand it. The daily and total dosage may have to be reduced to suit the patient's condition. During the course it is most important to keep up the general health of the patient by careful attention to his nutrition and blood picture.

The results of X-ray treatment vary with the type and radio-sensitivity of the tumour. A polypoid growth often shrinks rapidly and opens up the lumen with considerable relief of obstruction and the patient can sometimes be carried through the treatment without any gastrostomy or dilatation. In the schirrus type of growth occasionally oedema and swelling of the tumour from radiation may increase the dysphagia and necessitate a gastrostomy and interruption of the rays. Most patients are benefitted by the radiation but many not as much as could be wished for. It is gratifying to see some who are able to swallow solid food for long periods. They may gain weight and live fairly contented lives for a few months. But these are very few and in almost all of these there is the inevitable return of symptoms sooner or later. Of all the patients treated with X-rays we have only two who are alive and well so far for more than two years, and only one passed the one year limit and died from recurrence soon after.

TABLE VI RESULTS OF X-RAY TREATMENT

Received complete treatment	20
Received incomplete treatment	19
Alive and well more than 2 years	2
Survived more than 1 year	3 (including 2 above)

*Radium treatment*—Radium has not been used much by us in the treatment of cancer of the esophagus. It has various drawbacks which will presently be discussed. Three methods have been used.

(a) *Intra-cavitary application*—A Levine tube is passed through the nose, and, under the screen, the upper and lower limits of the growth are marked on the tube, so that the length of the lesion and its distance from the nostril are obtained. Radium capsules are then arranged in tandem over the required length and the tube passed into the esophagus and the position of the radium checked under the screen. Daily treatments lastings for from

3 to 6 hours are given to add up to the total dose decided upon. As it is impossible to measure accurately the extent and depth of the disease the tumour dose given so far has been empirical. A dose of 150 mg hours per cm length has been tried with satisfaction in one patient. The result obtained may be illustrated by the following case.

Case No 3314 Mrs B G aged 45, history of slight dysphagia of 2 months' duration. Fluoroscopy with barium revealed no abnormality. Esophagoscopy discovered a small segment of the anterior wall in the mid-thorax that did not move well on respiration. A biopsy from this revealed epidermoid carcinoma grade 2. Treated by above method with 1400 mg hrs in Jan '43. Alive and well and able to swallow all foods when last seen on 5-1-'44.

Although a satisfactory result was obtained in the above patient the number of patients that are suitable for this treatment are few. It is only possible in those cases that permit the passage of a stomach tube. We do not like to use this method in the polypoid lesion because of the risk of bleeding. Only the short scirrhus lesion is best suited for this treatment. The great objection to this mode of treatment is that an adequate cancericidal dose cannot safely be given. If the outlying portion of the growth has to receive a sufficient dose the surface dose to the inner wall has to be so high that there is the risk of perforation from sloughing of this wall. Theoretically this treatment can only be proper in a very superficial lesion that has not penetrated far.

(b) Needling the growth through the esophagoscope is not a good procedure. Only the upper presenting surface can be so treated and the rest of the tumour is inaccessible. We have used it in only one patient.

(c) The insertion of radon seeds in the tumour after exposure through a thoracotomy is only useful in those cases where exploration reveals an inoperable condition. A major operation only for the purpose of placing radon seeds is hardly justified.

#### SUMMARY OF CASES TREATED WITH RADIUM

Total number of patients treated with radium	8
Treated by the intra-cavitary method	4
Treated by the insertion of radon through esophagoscope	3
Treated by radon after thoracotomy	1
Result—only one patient (Case No 3314) alive and well for more than one year	

From our experience and from a study of the literature we do not think radium applied locally is of much value in this disease. The only solitary worker who has reported fair results with it is Guisez<sup>7</sup> who has used it extensively and has a few patients alive and well more than 10 years. Other workers who have tried the same technique have miserably failed to even remotely approach his results.

After an experience of a large number of cases one realises that the problem of esophageal cancer still remains to be solved. This review of our cases emphasises the unsatisfactory state of things and calls for a more determined effort on the part of the radiologist to evolve a more effective technique. Until such time as this is found we would urge surgeons to attempt resections particularly in lesions at the lower end, where the outcome from the patient's point of view can be gratifying.

### Summary

- (1) A review of 153 cases of cancer of the esophagus is given
- (2) The importance of early and careful radiological and esophagoscopic examinations is pointed out
- (3) The poor outlook from present day routine methods of treatment is indicated
- (4) A plea for radical surgery in suitable cases is made
- (5) An outline of the treatment carried out at the Tata Memorial Hospital is given and the various methods and their selection and application are discussed

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# GASTROSTOMY IN CANCER OF THE ESOPHAGUS

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Gastrostomy plays a very definite and important role in the treatment and management of cancer of the esophagus

Its chief indications are —

- 1 To permit proper and sufficient nourishment to the markedly emaciated and malnourished cases of cancer of the esophagus
- 2 As a preliminary to X-ray or radium treatment
- 3 As a first step to operative procedures on the esophagus
- 4 To give rest to the cancer bearing esophagus, causing less irritation and fermentation, and thus less pain and misery
- 5 To allow retrograde esophagoscopy or insertion of radium tandem or any operative manipulations such as dilatation, etc

A gastrostomy is said to be ideal when it fulfils the following conditions —

- 1 It should form a gastric fistula which in no way is affected by the action of gastric juices
- 2 It should be permanent and easy enough for the patient to insert a catheter and feed himself
- 3 It should not allow any leakage of gastric juice or gastric contents
- 4 It should permit gastric digestion unhampered —not interfere with the physiology of the stomach and should not restrict the patient to bed

If a gastrostomy is to be performed for cancer of the esophagus, the earlier it is done the better it is for the patient. It should not be put off till there is considerable loss of weight and strength. Its presence causes no discomfort in a case that is able to swallow liquids. The patient may defer using the stoma till obstruction supervenes.

There are several types of gastrostomy, but very few meet the requirements stated above. The history of gastrostomy is interesting. In 1849 Sedillot described the earliest type of gastrostomy. It was a simple stomach cone brought up to the peritoneum forming a fistula through the abdominal

wall. This was far from being satisfactory because of the leakage, and hence numerous modifications were soon suggested. In 1891 Witzel created an intramural canal. Some years later Senn devised an inverted cone from the gastric wall by a series of inverting purse string sutures. A majority of these methods depended upon a tract lined by granulation tissue and required a constant inlying catheter to guard against stenosis or closure of the tract.

Noticing the futility of such methods, attention was now directed towards forming a plastic tube from the stomach wall itself. DePage in 1901 was the first to perform a plastic tube out of the anterior wall of the stomach. The base of the tube was placed towards the lesser curvature. Such tubes were usually short in length and so Hirsch in 1911 made a tube from the longer flap of the anterior wall of the stomach placed longitudinally, having the base towards the fundus. However, the blood supply of such flaps used to be very poor and many of the tubes sloughed away.

Jianu in 1912 devised a tube from the greater curvature of the stomach with the base at the fundus. The flap from which the tube is constructed has the left gastro-epiploic artery as its main blood supply. Finally in 1913, Janeway evolved his method of gastrostomy, utilizing a flap of anterior gastric wall with the base at the greater curvature. The plastic tube thus formed has a very good blood supply. It does not alter the shape of the stomach nor interfere with its physiology. A still better modification of the Janeway gastrostomy is the Spivak gastrostomy in which a fold of gastric mucosa is created by plicating the stomach wall at the base of the tube forming a valve which prevents leakage.

The most common variety of gastrostomy performed in our hospital is the Janeway type. A large number of the esophageal cancer cases come to us in a markedly low and dehydrated state. It is well worth the labour and time involved in combating this low state and dehydration by sufficient bed rest and repeated infusions of 5% glucose in normal saline.

Attention to teeth and supply of vitamins play an important part in pre-operative management.

The operation of gastrostomy is simple but yet so very important that we feel a detailed description of the operation is not out of place in this paper.

This operation is done under local anaesthesia. The line of incision and the rectus sheath are infiltrated with 1 per cent Novocaine solution and this anaesthesia is supplemented with intercostal nerve block on the left side with the same solution. The incision is a longitudinal one, situated over the outer half of the rectus muscle, beginning on the costal margin and extending downwards to a distance of 6 to 7 cm. The skin and superficial fascia are incised. The cut skin edges are then covered with skin towels. The anterior rectus sheath is incised and the left rectus muscle split in the direction

of its fibres. The manoeuvre brings into view the posterior rectus sheath with the transversalis muscle. More Novocaine solution is now injected into the posterior sheath, reaching the peritoneum along the whole length of the exposed area. The posterior sheath and the transversalis are then divided longitudinally and together with them the peritoneum. The body of the stomach from which the plastic tube is to be made, lies directly under the upper portion of the left rectus and adjacent costal margin. Therefore, this short, left, midrectus incision brings easier access to this part of the stomach than any other incision devised. As soon as the peritoneal cavity is opened, two wet abdominal towels are so placed that they protect the cut edges of the wound. This step is very essential because in these devitalised and poorly nourished patients, if any spillage occurs into the cut tissues, a severe infection of the abdominal wall occurs, which may prove very serious.

A brief and limited exploration of the anterior surface of the liver, pre-aortic and perigastric regions for secondary deposits, is carried out. The stomach usually presents itself in the wound, if not, then with a smooth sponge holding forceps, and with constant but gentle traction, a sufficient portion is delivered through the wound to permit the entire operative procedure on the stomach to be done outside the abdominal cavity. When pain, discomfort and retching are complained of with this manipulation, a good plan is to infiltrate the gastrohepatic ligament with Novocaine. Having brought the stomach out, the abdominal cavity is shut off by two more dry abdominal towels arranged round the stomach. Care should be taken that the plastic tube is constructed from the body of the stomach rather than from the pyloric antrum. In the latter case, leakage and discomfort after feeds are very frequent. In our series of cases, on three occasions, tubes were constructed from the pyloric region of the stomach and these patients suffered a good deal of discomfort and leakage.

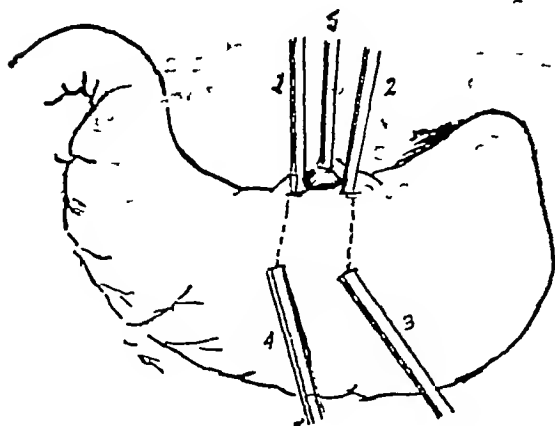


Fig 1,

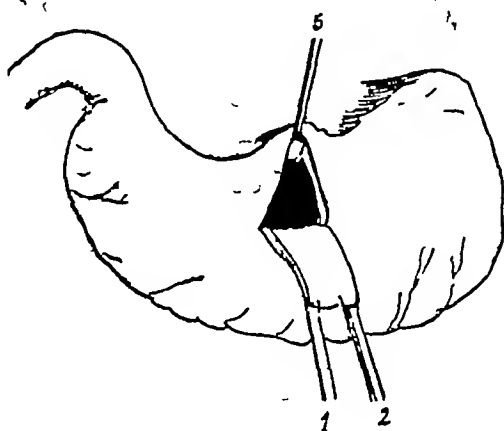


Fig 2

A rectangular flap about  $3\frac{1}{2}$  cm long and 3 cm wide with its base towards the greater curvature and its free edge at the lesser curvature is outlined by placing four Allis clamps as shown in Fig 1. A fifth Allis clamp is placed opposite the mid point of the proposed free edge of the flap on the lesser curvature. The first incision is made at the proposed free edge of the flap which is parallel to the lesser curvature. The wall of the proposed flap is incised upto the submucous layer where numerous blood vessels are visualised. Formerly, we used to enter quickly the stomach cavity at one point and rapidly cut off the marked flap. But frequently we noticed that the bleeding was more than usual, thus, lately we have made it a point to catch most of the blood vessels running in the submucous coat on either side of the proposed incision into the mucosa. The stomach cavity is then entered at the free edge of the flap. The suction rod is placed in and the contents aspirated. From this point onwards, all the instruments that are used are placed on a separate towel and are discarded as soon as the stomach tube is constructed. With long straight operating scissors, the rest of the flap is cut out and few bleeding points left over are carefully caught and ligated. We use cotton thread J P Coates No 50 to ligate blood vessels, and also to suture the muscular and serous coats. The mucous membrane is sutured with chromicised catgut. The fifth Allis clamp placed opposite the midpoint of the free edge of the flap on the side of the lesser curvature, marks the point where the suturing is to be commenced as shown in Fig 2. The cut edges of the mucous membrane are carefully apposed by suturing with No 00 chromicised catgut on a straight fused needle, using the continuous blanket stitch. Just before

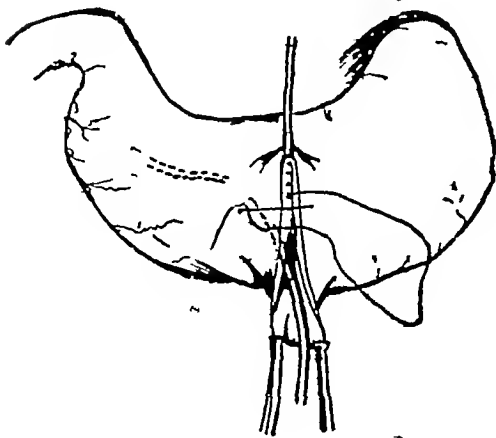


Fig 3

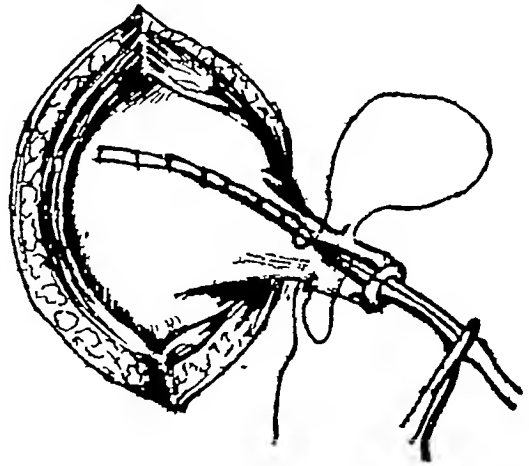


Fig 4

finishing the distal end of the tube, a catheter No 14 (French) is introduced into the stomach cavity. Formerly, it was the practice to pass the catheter

right down into the duodenum but recently it has been realised that this is quite unnecessary and even harmful, because it causes rapid distention of the duodenum with the feeds. The second layer apposes the muscular wall and the serosa. This is done with waxed cotton thread of J P Coates No 50, using a continuous interlocked Lembert suture as shown in Fig 3. When sutures are completed to the apex of the gooseneck thus formed, they are cut long and clamped along with the end of the catheter so as to secure the catheter and the plastic tube until it is sutured in place as shown in Fig 4. The stomach is now returned to the abdominal cavity and if possible, the omentum wrapped around the plastic tube. At this stage, all the instruments used since the opening of the stomach are discarded. The surgeon and his assistants change into fresh sets of gloves and a separate set of instruments is used for the closure of the abdominal wall.

Closure of the peritoneum is started at the lower end and finished off at the level of the plastic tube which is held at the uppermost angle of the incision. Great care is needed in closing the peritoneum snugly around the tube. The split rectus muscle is replaced and a small rubber drain is placed at the lower angle, reaching right down to the peritoneum. The anterior rectus



Fig 5 Shows appearance of a good gastrostomy stoma, site & size of incision,

sheath is now sutured. The stoma of the tube is allowed to protrude  $\frac{1}{2}$ " above the skin level. The mucous membrane is sutured to the skin by four sutures. A vaseline dressing is applied round the stoma and the catheter is allowed to protrude through the gauze dressing.

In order to maintain a low morbidity and operative mortality, certain principles must be observed.—

This operation must be done under local anaesthesia as general anaesthesia in these dehydrated, emaciated patients is not without serious danger and is unnecessary

The abdominal incision must be small but adequate. With a small incision, evisceration does not occur and it allows the patient to be out of bed safely on the third or fourth day. It also prevents lung complications which these patients are so apt to get.

### POST-OPERATIVE MANAGEMENT OF GASTROSTOMY CASES

This management resolves itself into two main problems.

- 1 The management of the local wound, the tube and its dressings, and the general care of the patient
- 2 The management of the gastrostomy feedings

Twenty four hours after the operation, the small rubber drain which has been placed in the lower end of the wound is removed, disturbing the dressings as little as possible. The stoma should always be inspected on the next day, if it is of normal pink colour then one is quite sure that the blood supply is good and nothing untoward can happen. If the stoma appears edematous or bluish, the catheter is either left out or is exchanged for one with a smaller calibre. Such a procedure frequently reduces the edema and improves the blood supply. In the Spivak type of gastrostomy it is our routine to have one of the doctors insert the catheter and help giving the feeds, for the first forty-eight hours. Later on, it is safe for the nursing staff to take over. Sometimes in the Spivak type, difficulty arises in the passage of the catheter due to congestion and edema around the stoma or the valve. Under such circumstances, we feel that it is much better to withhold rather than persist in passing the catheter and making a false passage or a perforation. In our series we have a couple of cases where such an unfortunate incident did happen. One of our cases had the complete gastrostomy feed poured into the abdominal cavity, but with conservative expectant treatment, she pulled through the catastrophe. Gastrostomy patients should be propped up in bed on the first post-operative day. They should be turned frequently from side to side, encouraged to take frequent deep breaths and to cough out any material in the lungs or throat. A number of patients complain of extreme dryness in the throat due to complete stoppage of all feeds by mouth. Frequent gargles with cold water make them feel a lot better.

In cases of complete esophageal obstruction, foul discharge and secretions collect above the site of obstruction. This is vomitted out from time to time. Such cases feel much comfortable with esophageal lavage three or more times a day.

If wound healing is perfect, the stitches are removed on the seventh day. Sometimes skin irritation occurs round about the stoma due to leakage

of acid gastric contents Relief is obtained by neutralizing the acid with soda bicarb compresses and keeping the irritated skin covered with Zinc Oxide paste

### MANAGEMENT OF GASTROSTOMY FEEDS

This is a very important problem needing constant care and adjustment of feeds to suit the disorganised and weak digestion of these patients

Feeds are slowly and gradually worked up to the full quantity For the first 48 to 72 hours, small quantities of water or peptonized milk are given through the tube and the rest of the fluid intake is made up by intravenous 5% glucose in normal saline

It has been estimated that a person not doing much physical or mental work requires in 24 hours, food having a value of 2400 calories By careful study and observation of the weights and state of nutrition of our cases, we have, in association with the department of biochemistry, evolved the following formula for our gastrostomy cases In 24 hours each person needs the following —

Buffalo-milk	40	ozs
Water	20	ozs
Wheat flour	2	ozs
Sugar	6	ozs
4 whole eggs & 4 whites of eggs, salt	4	drachms
& Iron in some form, about	10	grains

The above formula is divided into the following convenient feeds,

#### *Feed at 6 a m*

2 eggs, 8 ozs buffalo-milk,  $1\frac{1}{4}$  oz sugar, a pinch of salt and juice of an orange

#### *Feed at 10 a m*

1 egg & 1 white of egg, 8 ozs of milk, 4 ozs of wheat porridge (2 ozs of flour mixed with 20 ozs of water allowed to boil for 30 minutes till the quantity reduces to 16 ozs and the resultant divided into four equal feeds)  $1\frac{1}{4}$  oz of sugar, a pinch of salt and iron in some form In our hospital we use 1 Tablet Fersolate

#### *Feed at 2 p m*

1 white of egg, 4 ozs of wheat porridge, 8 ozs of milk,  $1\frac{1}{4}$  oz sugar, a pinch of salt and juice of an orange

#### *Feed at 6 a m.*

1 egg and 1 white of egg, 4 ozs of wheat porridge, 8 ozs of milk,  $1\frac{1}{4}$  ozs of sugar, a pinch of salt

Feed at 10 a.m.

1 white of egg, 4 ozs of wheat porridge, 8 ozs of milk,  $1\frac{1}{4}$  ozs of sugar and a pinch of salt

On such a formula, patients have steadily increased in weight and improved in general health. In cases of decrease in weight the quantity of feed is increased till improvement occurs in weight and general condition. If diarrhoea supervenes then feeds are cut down and gradually built up.

Before discharging the patient from the hospital, he is taught how to prepare his feed and the method of feeding.

On reviewing the first 5000 cases recorded at the Tata Memorial Hospital, we noticed that there were 153 cases of cancer of the esophagus. The following Table indicates the type, the number, the indications and the mortality and morbidity of gastrostomies done at our hospital.

Type of Gastrostomy	Number (Total 66)	Time and indication	MORTALITY (Total 8)	Morbidity
Janeway	42	Pre-operative 6 Pre-radiation 28 In course of radiation 6 After completion of radiation 2	(3 cases died) 1 died on 8th day from coronary thrombosis. 2 died from debility within 8 days.	Wound infection was present in 16 cases out of 66
Spivak	16	Preoperative 1 Pre-radiation 14 In course of radiation 1	(3 cases died) 1 died from Pneumonia within 6 days. 2 died from Peritonitis, both on the 8th day.	
Jianu	4	All pre-radiation	1 died from debility & infective enteritis	
Senn	4	Performed in very feeble patients with extensive disease	1 died from Pneumonia on 6th day.	

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# ANAESTHESIA FOR THE SURGERY OF THE ESOPHAGUS

BY

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ANAESTHETIST, TATA MEMORIAL HOSPITAL, BOMBAY

Regions of the body which were for a long time considered inaccessible to surgical intervention are now being successfully operated upon. In this category the esophagus holds a prominent place. The conduct of anaesthesia for the surgery of the esophagus will be greatly influenced by the anaesthetist's knowledge of the physiology of respiration. The general principles of anaesthesia are the same whether the site of operation be the esophagus, the lungs or the heart, i.e., the management of anaesthesia in the presence of pneumothorax.

A study of the effect of pneumothorax in the physiology of respiration will give an idea of the anaesthetic technic to be used. When one of the pleural cavities is opened widely by operation, the negative pressure surrounding the lung is supplanted by atmospheric pressure, the lung collapses, and the mediastinum with its contents is pushed to the opposite side.

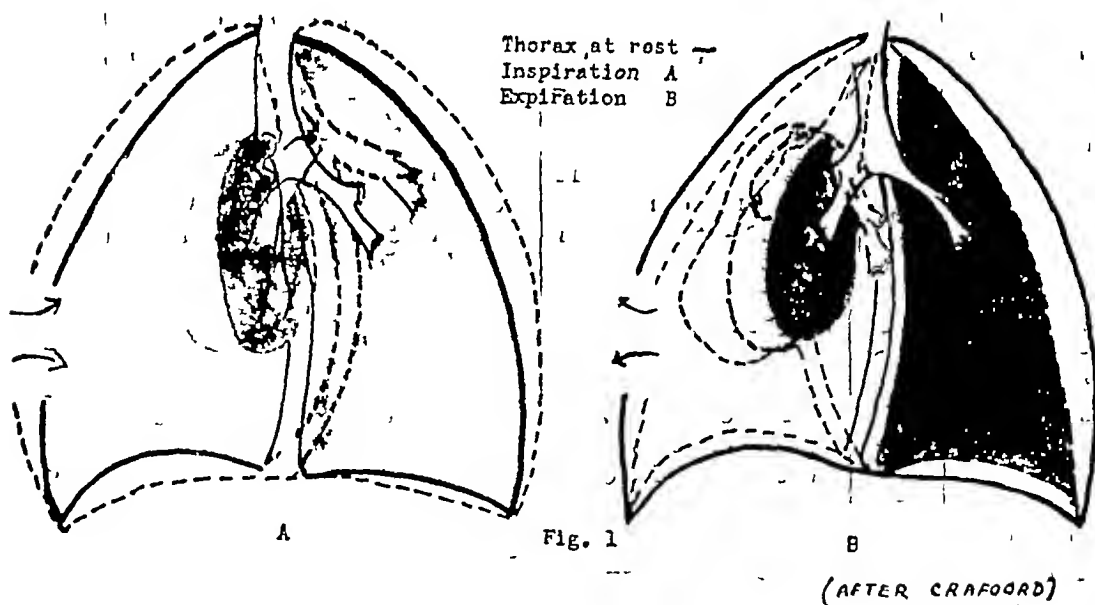


Fig 1 shows the alterations in the physiology of respiration during inspiration and expiration when one of the pleural cavities is opened widely<sup>1</sup>. During inspiration air rushes in from the outside through the trachea into the lung on the sound side due to expansion of the thorax and increased negative pressure in the lung. As soon as the intrapulmonary pressure on the

sound side becomes more negative air flows in also from the lung on the opened side into the lung on the sound side. During expiration the increased pressure blows the air out of the functioning lung. When the air passes the carina a part of it flows back into the lung on the opened side where the pressure is still reduced and a part of it passes out through the trachea. At the same time, the mediastinum shifts back and forth with each cycle of respiration, disturbing the heart and great vessels. It will be seen from this that the obvious result of the paradoxical respiration is low tidal volume and impaired gas exchange.

The problem of controlling intrapulmonary pressure and paradoxical respiration occupied the attention of Thoracic Surgeons and Anaesthetists for many years and resulted in the use of several ingenious devices and methods for anaesthesia. Negative pressure chambers, constant flowing positive pressure gas anaesthesia machines and rhythmically working respiratory pumps were developed in order to correct these respiratory changes and shifting of the mediastinum.

Recently a new technic called "controlled respiration"<sup>2</sup> is being used by anaesthetists for open-chest anaesthesia. Controlled respiration is a term applied to a condition where pulmonary ventilation is under the control of the anaesthetist, i.e., respiration is passive on the part of the patient and active on the part of the anaesthetist. Three factors are essential to its attainment (a) the production of apnea by over-ventilation, using the carbon dioxide absorption technic, (b) the continued suspension of all respiratory efforts by maintenance of proper ventilation and (c) the ability to start the automatic breathing at will.

The production of initial apnea is brought about as follows: when the cyclopropane or ether anaesthesia is established and intratracheal intubation performed, the breathing bag is squeezed gently during the latter half of each inspiratory phase of respiration. As a result of this hyperventilation the  $\text{CO}_2$  content of the blood is decreased and fails to stimulate the respiratory centre to initiate the contraction of the respiratory muscles. Within a short while all respiratory movements cease, the anaesthetist then maintains ventilation by manually compressing the breathing bag to effect inspiration. Expiration is accomplished by the elastic recoil of the lungs. The anaesthetist should imitate what he believes to be the normal exchange for the particular patient. The depth of anaesthesia and the use of controlled respiration technic should be such that normal automatic breathing should start within a minute after the manual compression of the bag is stopped. Sometimes removing the soda lime and continuing the ventilation starts the normal breathing.

We have used exclusively this principle of controlled respiration in the anaesthesia for the surgery of the esophagus.

# TATA MEMORIAL HOSPITAL

## ANESTHESIA RECORD

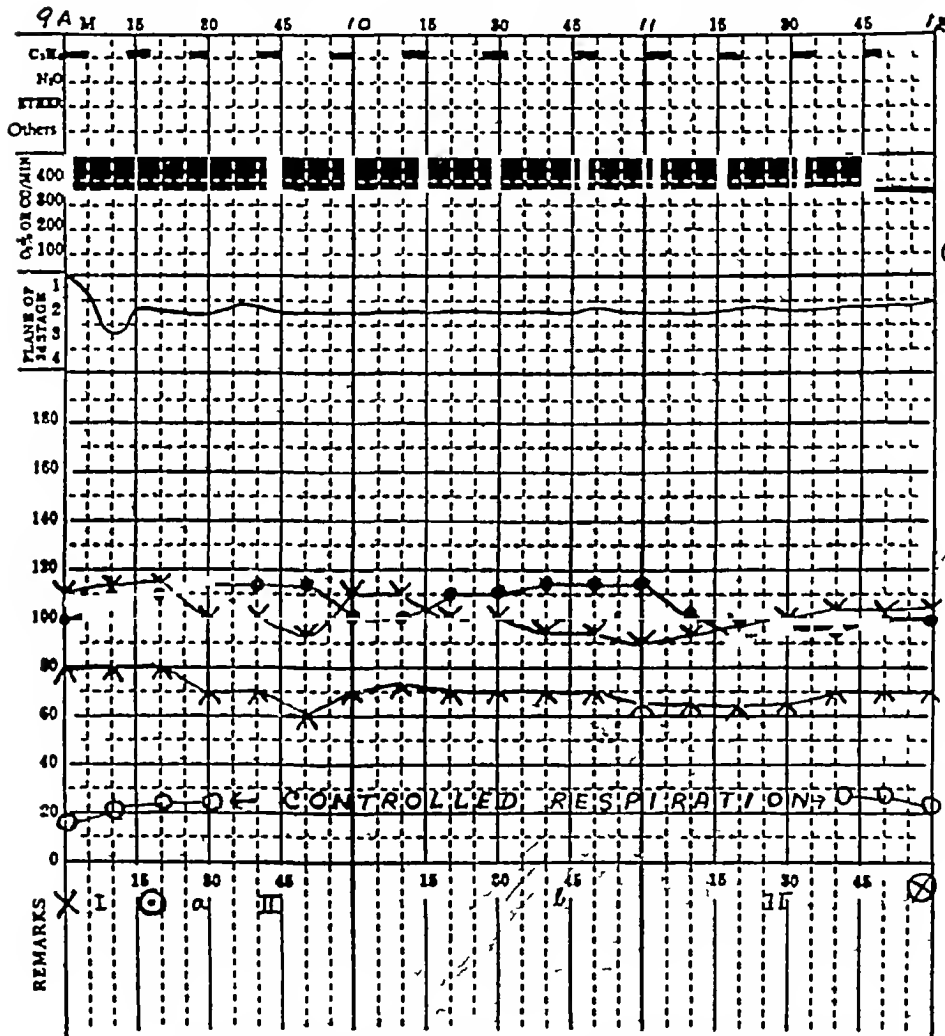
Date 4 10 43

Mr. G. ... Age 58 ... Time 9:00 AM ... OR ... I

On Proposed. ... .. TransThoracic Oesophago gastrostomy ... .. Surgeon. Paymaster

Ans. Hist Neg ..... S ~ .. ... U ... ..

Pre-medication ... Morphine gr 1/6 and atropine gr 1/50 at 7:30 AM (S) ...



## INDUCTION

Exc. .. N E... Cough...

Laryngospasm. — *See* *Spasm*.

(Sal) ... Others, .....

## MAINTENANCE

## I Oral Intubation

## II Pteris, Opuntia

III Plasma cloud

a Infuscon

## 6 Transfusion

v. Systolic bp

^ Dear the lps

● Pulse

## O Respiration

x Start of another

④ Start of Surgery

⊗ End of Operation

**POSITION**

At school position

Agents: Ind Cyclopropane - Oxygen Mixture Cyclopropane - Oxygen

Tech. Ind Absorption Matrix Oral 2 cuff Abs

Operation... Trans-thoracic Oesophago-gastrostomy ...

**PAYMASTER - BORGES - MEHER HOMJI - JUSSAWALLA**

Anesthetists **SIRCAR**

## RECOVERY

Reflex in O R Yes ☒ No ☐

Уопи... ..

Exit : ..

Others CO<sub>2</sub> used after reaction  
to ventilate collagen bag

*Anaesthetic agent*—Cyclopropane has been the anaesthetic of choice as suggested by Rovenstine.<sup>3</sup> This particular agent has been selected because of certain advantages. Both induction and recovery of anaesthesia are pleasant and quick, respiration is not stimulated, mucous membrane-irritation is absent and a high concentration of oxygen can be administered.

*Technic*—The technic begins with pre-operative medication—a dose of morphia and atropine in the ratio of 25 to 1, *i.e.*, morphia gr  $\frac{1}{4}$  and atropine gr  $\frac{1}{100}$  has been used routinely an hour and a half before operation. The administration of a barbiturate on the day of operation has not been our practice. The patient is then anaesthetised with cyclopropane and oxygen by Waters' "to and fro" carbon dioxide absorption technic. When the desired depth of anaesthesia is reached an oral intratracheal intubation is done with "direct-vision" laryngoscopy. A Magill tube with Waters-Guedel cuff is used to seal off the trachea. The patient is then turned to the right lateral position for surgery. When the surgeons are about to open the pleura the anaesthesia is then administered by the controlled respiration technic. This method is continued throughout the operation till the pleura is again closed. During the surgical procedure the left lung is kept collapsed for exposure of the esophagus, hence it is necessary to inflate the lung every ten minutes when surgery should be temporarily stopped.

It has been our practice to do a tracheo-bronchial aspiration before the patient is sent to the ward. Oxygen has also been administered routinely either by the oropharyngeal catheter or by the oxygen tent.

Fig 2 shows the anaesthetic chart of a case of trans-thoracic esophago-gastrostomy done with cyclopropane anaesthesia and "controlled respiration" technic.

### Summary

Anaesthesia for the surgery of the esophagus as practised in our clinic has been described. The problem of pneumothorax and its effect on the physiology of respiration has been fully discussed.

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## INJURIES OF THE THORAX\*

(Continued from Vol VI, No 2)

BY

C. S. PATEL, F R C S (ENG)

### Injuries of the Heart

Surgery of the heart has rapidly evolved during the past 30—40 years as a result of the attempts made in the treatment of wounds of the heart. We must consider the heart and pericardium together because they are so intimately associated that the injuries usually affect both of them.

The heart is fairly well protected from any ordinary type of trauma. This is due mostly to its position in the thoracic cavity—protected by the sternum. Many mild injuries of the heart escape un-recognised.

My personal experience of injury to the heart amounts to three cases only—one with a tear in the pericardium without hemopericardium, the second with a tear in the pericardium and a superficial wound of the right ventricle with a small collection of blood in the pericardial cavity and the third of a stab of the left ventricle with hemo-thorax and hemo-pericardium. The first two cases survived while the third one died.

Injuries of the heart fall into two groups—non-penetrating or subcutaneous and penetrating or open.

#### NON-PENETRATING INJURIES

These injuries usually result from contusions and crushes of the chest and the damage to the heart may vary from minor and temporary disturbances of function to extensive contusion and laceration of the heart muscle. Such injuries may result from (1) blows over the precordium, (2) compression of the heart between the anterior chest wall and the spine as in runover accidents, (3) indirect violence as a result of sudden compression of the thigh on the abdomen as happens in parachutist accidents and falls from great heights, and (4) as a result of blast injuries.

The condition of the heart—systole or diastole—at the time of the impact determines the damage—more damage being caused during systole. A diseased wall of the heart will naturally give way more easily than a healthy one.

Apart from visible injury, there is an imperfectly understood condition known as “Commotio Cordis” or a concussion of the heart. In this condi-

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\*A paper read before the V Annual Conference of the Association of Surgeons of India.

tion there are produced disturbances in the function of the organ without any demonstrable changes in the structure of the heart. Sometimes there are minute contusions in the muscle. These disturbances are attributed to nervous or vascular changes, but proof of this is lacking. Precordial discomfort amounting to pain of anginal type with dyspnoea and cyanosis are present. The patient is usually restless and there is much precordial distress. The pulse is weak and irregular. The diagnosis is made from the above symptoms, following the injury and from the history of the previous good health of the patient. The treatment consists in giving absolute rest till normal function of the heart is restored.

Contusion of the heart muscle is associated with disturbances of structure and function such as dilatation of the heart, tachycardia, arrhythmia and heart block. The contusion may heal by absorption of blood and subsequent connective tissue formation and cicatrization. Such a contused area may rupture if further force is applied to it, before healing occurs. Aneurysm may develop in the area so affected.

The signs and symptoms of a contused heart are pain over the precordium, cardiac distress, restlessness, cyanosis, weak pulse and weak heart sounds. Heart block is of frequent occurrence. A valvular murmur may sometimes be heard. X-rays may show an enlarged cardiac shadow due either to dilatation or pericardial effusion. Electrocardiogram often shows definite changes.

Treatment consists in complete rest and in cases showing marked pericardial effusion, paracentesis pericardi or pericardiectomy will have to be seriously considered.

Cardiac rupture may occur as a result of the various compression injuries already mentioned. As a result of the compression, the heart bursts at its weakest point, and it has been found that all the four chambers are about equally involved, though according to Peacock and Newton, the left ventricle and right auricle are more affected than the right ventricle and left auricle. Occasionally a rupture may be multiple. The pericardium may or may not be ruptured at the same time. Death occurs almost instantaneously in most cases. In those that survive, shock is pronounced. There is very severe precordial pain and fear of impending death. In those cases in which rupture occurs with an intact pericardium, cardiac tamponade takes place. In this condition blood escaping from the heart accumulates within the pericardium. The normal capacity of the pericardial cavity is about 200 to 300 cc, but it can accumulate a very much larger quantity, provided the accumulation occurs slowly. When the accumulation occurs rapidly, as in rupture of the heart, pressure symptoms arise. These result from pressure on the thin-walled auricles and veins and also from angulation of the veins produced by the forward displacement of the heart by the accumulated blood. The weight

of the distended pericardium also contributes to this effect. As a result of the compression of the auricles and veins, the venous blood cannot enter the heart and accumulates in the systemic veins. The patient is extremely restless, perspires profusely and his body surfaces are cold. His face which was pale, due to shock before, becomes cyanosed and the veins of the neck and head are distended. The liver is enlarged. The pulse which was rapid at first becomes weak, irregular and fluttering. There is much oppression in the precordium and fear of impending death. The blood pressure falls and the patient soon becomes unconscious. On examination of the heart the cardiac area is increased and the heart sounds are muffled, obscure or even absent.

Treatment of a ruptured heart is rarely possible because death occurs instantaneously in most cases. In those that survive the initial period, an open operation with suture of the rupture may be undertaken. In all cases of cardiac tamponade, an operation should be promptly undertaken, even in most desperate cases because as soon as the pericardium is incised and the pressure relieved, the heart action improves.

Besides concussion, contusion and rupture of the heart, other internal cardiac injuries have been noticed as a result of trauma. Rupture of the papillary muscle has been described. Senac has described a case of traumatic rupture of a valve. The aortic valve is much more often ruptured than the mitral and the tear in the valve occurs usually as a prolongation of a tear in the chorda tendinea, or the papillary muscle. Rupture of the pulmonary valve is an extremely rare condition. Prognosis of these cases is extremely grave. If they recover, aortic and mitral incompetency results as a permanent sequel. Treatment consists in absolute rest and medical treatment.

Dislocation of the heart due to extensive tear in the pericardium has been described to occur into one of the pleural cavities. X-ray clinches the diagnosis. Thoracotomy and replacement of the heart in its proper position should be the line of treatment adopted. Various sequelae, like auricular flutter, auricular fibrillation, extra systoles and varying degrees of heart block have followed the non-penetrating injuries of the thorax where cardiac involvement has occurred. These injuries are often not sufficiently recognised and the diagnosis is not often made. The medico-legal importance of these injuries necessitate a careful study and close observation of these cases. X-ray pictures and electro-cardiograms are of great value in the diagnosis of the heart conditions following trauma.

#### PENETRATING INJURIES OF THE HEART AND PERICARDIUM

Penetrating wounds of the heart are much more common than non-penetrating ones but very few attain surgical importance as most cases end fatally on the spot, or a little later, and very few cases come to the hospi-

tal for surgical aid. Gunshot wound of the heart will seldom be an isolated lesion and it is often accompanied by severe damage to other thoracic organs. The wounds of the heart in warfare are often extensive. Rarely the heart may be blown to pieces. Severe laceration may be caused by missiles which pass through and through the organ or they may be lodged in one of the cavities of the heart. War wounds of the heart may be aseptic or carry with them sepsis of a very severe degree. Gunshot wounds of the heart are instantaneously fatal. Hardly one or two per cent of the penetrating wounds of the heart belong to the category where surgical treatment is possible. The majority of these wounds are usually stab wounds and few of these are amenable to surgical treatment.

Penetrating wounds of the heart are caused by pins, needles, cutting weapons like knives, daggers, etc., missiles, bullets, shots, shells or shrapnel fragments. Wounds caused by pins and needles are not of very great consequence as contraction of the musculature of the heart usually closes the track caused by the needle. I remember a case of an injection needle being broken into the heart during a successful attempt at resuscitation and left in situ. This has led to no serious consequences afterwards. Injuries of this type may prove serious if a vital part of the heart including a coronary vessel has been penetrated. Possibility of a natural recovery is greatest in punctured wounds caused by needles or pins, while in wounds caused by gunshot, missiles, or knives, the possibility of natural recovery is much less, as there is usually too great a destruction and laceration of the edges of the wound to promote natural healing. The right ventricle is more often involved by stab wounds caused by knife or daggers, while the left one is more frequently involved in gunshot or bullet wounds.

In the majority of cases there is usually an association of pneumothorax and laceration of the left lung which complicates the diagnosis and influences the prognosis of the wounds of the heart. In the rare event of a missile entering through the inferior vena cava, there is no wound in the pericardium, in all others there is always at least one.

Penetrating wounds of the heart end fatally in the vast majority of cases. This is due either to failure of circulation resulting from the destruction of the organ itself or to the destruction of the conducting system—sino-auriculo-ventricular nodes and bundles. If they survive, haemorrhage is one of the most serious effects of the wounded organ. Blood collects in the pericardium and escapes into pleura or to the exterior. Haemorrhage is so severe that death usually occurs soon. If the wound in the pericardium is small, the blood cannot escape outside, cardiac compression supervenes and if not relieved, leads to a fatal termination.

Endocardiac thrombosis at the site of the lesion may occur and pieces of clots may be swept into the circulation giving rise to embolism in various regions of the body.

## SIGNS, SYMPTOMS AND DIAGNOSIS

There is a great deal of variance in the clinical picture of each individual patient, so it is difficult to give a comprehensive symptomatology of those causes. It is astonishing to note that sometimes the patient remains in an apparently good condition in spite of a very severe wound of the heart. They walk distances and come to the hospital. Small pricks in the heart may not produce any appreciable symptom.

## CASE NOTES

A patient was brought to the operation theatre during a riot day with all his clothes soaked with blood and a penetrating wound in the chest wall in the left fourth intercostal space about 2½ inches from the midsternal line. The wound was oozing a little blood, his limbs were cold, clammy and perspiring all over. The pulse was fast. I was busy with another urgent operation for large and progressive haemorrhage in the pleural cavity due to a stab in the lung and it took about 20 minutes before this patient could be taken up for operation. A large incision in the fourth intercostal space was made and the fourth rib was detached from the costochondral junction. Rib-spreader forcibly opened, gave an excellent view of the lung, heart and the pericardium. There was a gush of blood every now and then from a torn pericardium into the pleura. The pericardial wound was rapidly enlarged and a wound was noticed in the left ventricle about an inch long and blood pouring into the pericardium with each systole. The bleeding from the heart was controlled quickly by the Sauerbruch grip and the wound sutured by four stitches. The pericardium was swabbed out and sutures were applied to the wound in the pericardium. The pleural cavity was cleaned out and blood clots were removed. The ribs were approximated by pericostal sutures applied at intervals. The wounds in the chest wall were closed finally. The patient died in the ward after two hours. This case has been mentioned here as an illustrative case showing that the injury, though it did not look so serious, proved extremely serious on exploration of the thorax.

The situation of a wound over the proecordium, round about will indicate the possibility of a wound involving the heart. Cardiac wounds may be found even in cases of bullet wounds situated in the lateral wall of the chest, in the axilla, or the shoulders.

Patients are usually pale, cold and collapsed. There is marked perspiration and a very rapid pulse. Shock is much pronounced. Increasing pallor, air hunger, increased pulse-rate and low-volume-pulse are also signs of internal haemorrhage. It is only after the treatment of shock has been carried out that some clue to the diagnosis of the cardiac injury may be had. Persisting pallor, persisting sweating and persistent cold and clammy skin with a feeling of suffocation and precordial pain, associated with an anxious look, cyanosis, and dyspnoea, and a weak imperceptible-low volume pulse are some of the pathognomonic features of cardiac wounds. This will be further confirmed if the clinical picture of cardiac compression is associated with physical signs of a large haemothorax. Great spurts of blood gushing out of the large gaping wound of the thorax at each cardiac beat, is indicative of a fairly

large size wound of the heart. In addition to these, premonition of death, restlessness and thirst are other associated symptoms indicating a heart lesion. The heart area may be found to be enlarged on percussioñ. The apex beat is not usually palpable either due to hemo-pericardium or to feeble cardiac action.

The heart sounds are diminished and give an impression of a quiet heart. Mill-wheel murmur may be found on auscultation and is recognised by metallic and splashing sounds like those produced by a water-mill and synchronous with the movements of the heart. These sounds are also found in injuries of the lung. So they are not of great value.

X-ray examination reveals air or fluid in the pericardium. Enlarged shadows of the heart may also be found. Kymography records will suggest a relatively immobile heart. In less dangerous cases electrocardiographic record will give some help. Prompt treatment will have to be instituted and exploration should be done immediately to save the life of the patient without submitting him for investigation.

#### TREATMENT

There will be a class of patients which requires no treatment except a close observation for the possible development of signs and symptoms indicating damage to the heart. There is another class of patients where nothing can be done to save life as they are in a hopelessly bad condition. Wounds caused by pins and needles, generally speaking, may not demand any special treatment. There is a class of patients for whom urgent surgical intervention is necessary to avoid fatal termination resulting either from internal haemorrhage or from cardiac compression. Stab wounds penetrating the heart will always require an immediate operation. If a bullet has been lodged in the heart and remains there without causing much symptoms, it should not be disturbed. A number of bullets have remained in the heart without causing much trouble. The only danger attendant in such cases is the formation of emboli. Spontaneous healing of heart wounds does occur particularly if the wounds are superficial and affecting a thick-walled ventricle, an instance of this I have already quoted in the beginning.

The mortality of operations on the heart was extremely appalling upto the end of the last century amounting to 80 to 85 per cent, during the present century, particularly during the last 30 to 40 years, specially during and after the great world war, the mortality of these operations has been considerably reduced. This is due to early diagnosis, institution of prompt measures, and improved technique of operations. Various workers in this field have collected details and the mortality varies from 35 to 65 per cent.

Increasing pallor, symptoms of cardiac compression and low pulse

volume demand an urgent operation. If time permits, restorative measures like warmth and infusion of fluids subcutaneously may be given prior to operation. A blood transfusion or auto-transfusion of blood collected from the pleura or the pericardial cavity should be given during operation if the hæmorrhage is severe. The question of infection resulting from the auto-transfusion of blood should not be considered a bar to its administration as it is a life-saving measure.

### APPROACHES TO THE HEART

A number of surgical approaches to the heart has been suggested by numerous workers. The most important of these are —

- (1) A long intercostal incision made by enlarging the parietal wound
- (2) Midsternal incision
- (3) Parasternal resection of cartilages and formation of chondroplastic flap

The long intercostal incision is to be preferred to the other approaches in cases where the pleural cavity is open. It is quite a simple incision and gives a sufficient exposure to the pericardium and the heart. Injuries of the lung are also well visualised and the heart is very rapidly approached through this incision. A brief description of this operation has already been given under the heading "Lungs and Pleura."

Some consider that the parasternal incision is much better, particularly because the wound does not involve the pleural cavity and keeps it free from infection if it occurs, while giving an excellent approach to the heart. This incision lies along the middle of the sternum and passes outwards along the sixth costal cartilage to the mammary line. At the upper end the incision is extended horizontally over the third rib cartilage. The structures from the front of the sternum are separated till the costal cartilages are exposed. The 3rd, 4th, 5th, and 6th costal cartilages are divided at their sternal ends. This flap is lifted up slowly and gently the cartilages fractured at their junctions with the ribs, the pleura being pushed outwards and downwards. The pericardium will be recognised by its glistening surface. If more room is required, the remains of the sternal ends of the costal cartilages and even a part of the sternum may be cut away with rongeur forceps.

The midsternal route consists in splitting of the sternum vertically in the midline. This is a severe operation and does not give any additional advantages. Besides, this requires special instruments.

Intercostal incision with detachment of the fourth rib from the costochondral junction and sometimes the fifth, with wide separation with rib-spreaders is a method of choice. I have used in all the cases. I have come across no difficulty in having sufficient exposure or proper exploration of heart.

wounds Very rapid operation; preservation of rigid asepsis and quick-decision as to what to do during the operation are essential for the success of the operation

The pericardial incision is enlarged and edges are held apart by tissue forceps. The blood is rapidly sucked out by an electrical sucker. The heart is found to be moving and difficult to handle. For examination the organ may be pushed this way or that, gently, or may be rotated partially with care without any disturbances in the cardiac action. It is only when it is lifted forwards or twisted forcibly or handled at the base that its action becomes irregular and tumultuous or ceases altogether.

### THE METHODS OF CONTROLLING BLEEDING DURING OPERATION

In cases of blood gushing out with every contraction of the heart it becomes difficult for the operator to recognise and to suture the wound. Bleeding from the heart during operations can be controlled by a number of methods of which two are most important. (1) If the wound in the heart is small, a transfixion suture is passed through the apex of the heart, and is held in the left hand to steady the organ, with the forefinger of the left hand placed over the wound as recommended by Ballance. If the wound is large this method is not satisfactory.

(2) The Sauerbruch grip is the method of choice to control bleeding in cases where the wound of the heart is large and aims at the temporary compression of atria and venae cavae. This may be secured by passing the middle finger of the left hand into the transverse sinus with the ring little fingers placed behind the heart. If these two are approximated, temporarily, the blood return to the organ is arrested. The grip should now and then be relaxed to allow some blood flow to the heart. The index finger and the thumb may be advantageously used to demonstrate and steady the wound in the heart.

Some operators press the base of the heart against the sternal border while others exert pressure on the right auricle. The method of putting the finger directly into the wound itself has been recommended by some. This has serious disadvantages. It will not only enlarge the wound but it will unnecessarily increase the time for suturing. Besides it will be difficult to apply sutures as the fingers come in the way.

Application of the tip of the finger is the best method of controlling the bleeding if the wound in the heart is small. If this does not control efficiently a stitch should be placed into each edge of the wound and the ends of the stitches are crossed over till the final sutures are passed. If the bleeding is very profuse, the Sauerbruch grip is the only course left to the operator.

After the bleeding is controlled, No 2 or 3 chromic catgut sutures are passed through the muscle with a round bodied needle. These are placed at intervals of about a quarter of an inch, and taking quarter of an inch of wall from its edges. Sufficient care should be taken not to damage any coronary vessels. Sutures should not pass through cavities of the heart. Sutures should not be too tight and should not include too much tissue. The suture should be tied during diastole preferably, but in my opinion it does not matter in what phase of the cycle the sutures are tied. A muscle graft may be included to arrest bleeding in some cases and the sutures tied over it.

During the manoeuvre, if the heart ceases to beat, allowing the organ to go in its own position, stroking its surface, by applying gentle pressure on the ventricle or massage and intracardiac injection may start the function.

Careful search is made for foreign bodies like missiles prior to the closure of the heart wound. If the missile is present and is easily felt in the cavity of the heart, an attempt may be made to remove it. The missile is coaxed to come out rather than forcibly withdrawn. Great care is taken not to inflict a further tear in the heart. Foreign body in the pericardium is to be treated in the same way. The foreign body which is embedded firmly in the heart wall or its cavities, should be left alone.

The pericardial sac is again cleaned out of blood with a swab and immediately sutured with continuous catgut stitches, with or without drainage as the condition demands.

Other injuries in the lung, pleura, etc., if found, are immediately dealt with. Ribs are approximated by passing at intervals 4 to 5 pericostal catgut sutures. Muscles are sutured as usual and the rest of the wound is closed.

Post-operative care consists in perfect rest. Transfusion or intravenous glucose saline should be avoided in order to limit the venous return to the heart. Infection of the pericardium and pleura should be closely watched for and early treatment in a needful case should be undertaken. Pneumonia, mediastinitis, and spread of infection to systemic circulation are complications which may end the patient's life. Endocardial thrombosis and embolism have been recorded.

Prognosis of a patient with heart wounds is certainly grave but howsoever bad the patient may look, operation should be performed and once the cardiac compression is relieved, the wound repaired and the bleeding arrested there is every possibility of his recovering. The results of the repair of the wounds of the heart are on the whole very satisfactory. Precordial pain, angina, irregularity of the heart and other sequelae may follow operations on the heart.

## Injuries of the Mediastinum

Though the mediastinum is well protected from injuries being guarded by the vertebrae behind, sternum in front and the lungs acting as buffers on either side, it is not uncommon for a severe crushing injury of the chest to cause damage. The fractured ends of the ribs may cause damage to mediastinal structures, injury to one of the intercostal vessels may lead to the formation of mediastinal haematoma, a crushing injury may cause rupture of the trachea or a main bronchus and may be responsible for the production of massive mediastinal emphysema.

The causes of crushing injury are similar to those producing injuries of the lung. The trachea, oesophagus and the great vessels may be torn and give rise to a massive haemorrhage and cause severe pressure, pneumothorax and emphysema. Penetrating wounds of the chest such as stabs by daggers, or knives and gunshot wounds may produce very serious damage to the mediastinal structures such as large vessels, trachea, bronchus, etc. Penetrating injuries are followed by the alarming symptoms of massive haemothorax, haemo-pneumothorax, mediastinal emphysema and, if the thoracic duct is involved, chylothorax. Acute mediastinitis of a fulminating type may follow these accidents if the patient survives. Injuries to the pulmonary vessels, ascending aorta, superior vena cava, innominate veins, and inferior vena cava have been recorded. As a rule, wounds of the great veins of the mediastinum are not immediately fatal. They succumb later on as a result of extensive thrombosis or infection following it, while wounds of the arteries prove immediately fatal from loss of blood. I had a case of a Pathan, stabbed in the 8th intercostal space, with an external wound at least 2 to 2½ inches long, and bleeding profusely. An immediate exploratory thoracotomy was performed. The pleural cavity contained a large haemothorax, this was removed by suction and swabbing. The lower lobe of the lung was cut right through except at the upper attachment to the bronchus and there was a tear on the diaphragm near the right pulmonary ligament with a small nick in the inferior vena cava. Lobectomy of the damaged inferior lobe of the lung was performed and one suture applied to the diaphragm. Oozing from the inferior vena cava was controlled by swab pressure and further checked by applying a muscle graft and maintaining a persistent but gentle pressure for about five minutes. The bleeding stopped and the wound was closed in the usual way, the patient made an uneventful recovery.

Injuries of the large vessels require immediate operation. A number of successful surgical operations on the great vessels of the mediastinum have been recorded. Relief of mediastinal emphysema by incision in the jugulum or by dealing with the cause has already been mentioned. Penetrating wound of the esophagus is an extremely rare condition and require

prompt treatment with drainage, otherwise it will lead to infection of the mediastinum. Injury to the thoracic duct may occur in penetrating as well as in non-penetrating injuries of the chest, though the incidence of this injury in non-penetrating wounds is greater than in cases of penetrating ones. Bullet wounds are often the cause of injury to the thoracic duct. A number of cases have been recorded in the literature of injuries of the thoracic duct. The clinical picture following injury of the thoracic duct is one of profound shock. After a latent period varying from 2 to 3 days the chest presents the signs and symptoms of pleural effusion which on aspiration proves to be a chyle. The striking feature of chylothorax is the rapid reaccumulation of large amounts of fluid even after repeated aspirations. Immediate cardiac failure may occur as a result of pressure caused by a large collection of fluid in the thorax or delayed death may occur after several weeks from inanition and asthenia. The treatment is very unsatisfactory and consists in aspiration of fluid to relieve the pressure and the adoption of sustaining measures. Intravenous injection of the aspirated chyle has also been suggested but found of to be of no great value.

Mediastinal emphysema and traumatic asphyxia are interesting conditions occurring in the mediastinum and have already been described under the heading of "Injuries of the Lungs and Pleura."

### THORACO-ABDOMINAL INJURIES

The association of injuries of the abdominal viscera with thoracic injuries is of very frequent occurrence in non-penetrating crushing injuries as well as in the penetrating injuries usually of the lower thorax. Out of a series of 307 cases, there were 28 cases of wounds of the diaphragm involving liver, spleen, or stomach. The incidence of abdominal injuries in penetrating stabs was greater on the left side than on the right. Herniation of omentum, stomach and spleen was found on the left side. There were 7 cases of stabs in the liver, 3 in the spleen, 6 in the stomach and 12 cases of wounds of the diaphragm. Out of these 12, in 8 cases there was herniation of omentum only. Rupture of the diaphragm from non-penetrating injuries due to indirect violence is more common on the left than on the right as the liver prevents the transmission of a sudden strain. A bursting tear of the diaphragm may be associated with injuries of the abdominal viscera in automobile accidents. Crushing injuries of the thorax may tear the diaphragm by fractured ends of ribs acting as direct traumatic agents. I have not collected statistics of non-penetrating injuries involving the thoraco-abdominal regions but it is believed that the incidence of such accidents has increased, owing to more frequent automobile and aeroplane crashes. In war injuries penetrating types of wounds play a greater role in thoraco-abdominal injuries. Though penetrating injuries are commonly found on one side only bilateral

ones are sometimes present. In both these types of injuries, shock and pain, and other clinical syndromes like pneumo-thorax, haemo-thorax, etc occur. In almost all the cases recorded above there was haemorrhage either from the lung, liver, stomach, the spleen or the diaphragm. Fast pulse and dyspnoea, resulting either from pneumothorax, haemothorax or other conditions associated with other intra-thoracic lesions may be present. Pain referred to the epigastrium, resistance of upper abdominal wall, tenderness, sometimes rigidity and referred pain to the shoulder are pathognomonic symptoms indicative of injuries of the abdominal viscera. Later, other symptoms may develop due to herniation with consequent disturbances in the function of the gastro-intestinal tract and to cardio-respiratory derangements. Symptoms are not acute in cases of simple herniation of the omentum through a tear of the diaphragm provided there are no other lesions in the thorax or the abdomen. In some cases there may be no symptoms except slight discomfort in the chest and the patient only comes when there are acute symptoms of strangulation.

The diagnosis of a traumatic diaphragmatic hernia is an extremely difficult problem particularly when only the diaphragm is involved. If the possibility of herniation in thoracic injury specially in penetrating wounds of the lower part of the thorax is borne in mind, there will be less chances of overlooking the condition. X-ray examination in doubtful cases may clinch the diagnosis by demonstrating abdominal viscera in the thoracic cavity. Herniation of the abdominal viscera into the thoracic cavity, produces a sense of distension in the stomach or colon. Displacement of the heart accompanied by some degree of dyspnoea will call for careful examination of the patient. Strangulation of the stomach or a part of the colon or occasionally of the small bowel is of great gravity and prompt measures will have to be undertaken immediately. As regards the treatment of traumatic rupture of the diaphragm, early operation is to be contemplated, once the shock is over. Other associated injuries will also require attention. Surgical repair of the hernia may be done by thoracotomy or laparotomy. Sometimes a combination of these routes may be necessary if abdominal injuries are suspected side by side with the thoracic injury. Careful and close exploration of the herniated structures is an essential step of the operation in order to find any tear in the viscus. Herniated viscus after repair if necessary is gently returned to the abdomen and the sub-diaphragmatic region is properly explored, for any damage to other structures. Crushing of the phrenic nerve in the thorax facilitates the operative manipulations. The diaphragmatic tear is closed with interrupted catgut sutures.

Besides herniation a tear in the liver or the spleen may be present; the principal symptoms will be haemorrhage in the peritoneum, pain, localized tenderness and rigidity of the abdomen, these will be associated with symptoms of involvement of thoracic viscera such as haemothorax,

pneumothorax, etc. Diagnosis is often difficult as lower thoracic injuries without involvement of abdominal viscera often produces rigidity, this, however, is of an intermittent type and is unilateral. Besides rigidity the sickness and vomiting also may occur in thoracic injury, but are more frequent in abdominal injuries. Injury to the diaphragm causes the thoracic type of respiration with a catch at the end of inspiration. At a later stage, pain referred to the shoulder region or to the clavicle, occurs.

The treatment of these complicated injuries naturally consists in the management of shock, and control of haemorrhage. Sucking wounds of the thorax will have to be immediately attended to and the liver tear may be sutured through the diaphragm if possible. Wounds of the kidney may be explored through the usual posterior incision. In injuries of a hollow viscus in the abdomen, the abdominal approach is indicated. It has been reported that a number of spleens have been removed through the thoracic route, but I think that the abdominal route is most desirable for removal of the spleen and to attend to other associated injuries. Sometimes the abdomen and the thorax have been separately opened to deal with these conditions. Out of the 28 cases of the abdominal injuries in association with the thoracic injuries among the series of 307 cases previously mentioned, there were 10 deaths, the mortality rate being 36 per cent. The high mortality rate is attributed to haemorrhage, prolonged operation and resulting shock, and part of it is due to missed injuries, either of the abdomen or of the thorax. In the Bombay City riot of 1932 total no. of patients who attended the out-door and indoor at the J J Hospital were 677—out of this 292 were inpatients and 73 were cases of chest wounds. 17 of these died giving a mortality rate of 20 per cent. 13 of these 73 were operated on (exploration of the thorax) with a recovery in 50 per cent of cases. 56 abdominal injuries were admitted and 28 died out of these cases, the mortality rate being 50 per cent. Thoraco-abdominal injuries as such carry a high mortality because of the multiplicity of their nature and non-recognition of their presence. It has been observed that wounds associated with injury to the hollow viscera carry a higher rate of mortality than those with involvement of the solid viscera. The mortality figures in the great world war in some hospitals amounted to over 60 per cent in thoraco-abdominal wounds while in civil practice these wounds carry a mortality rate of 25 to 30 per cent, because of the lesser involvement of the organs in civil wounds and their comparative freedom from sepsis.

My thanks are due to Mr S R Moolgavkar and to the late Dr P T Patel for their inspiration and guidance, to Drs E J Ramdas and S G Talwalkar, anaesthetists to the J J Hospital, Drs S P Mehta and K Vulkarni for valuable help in collecting statistics and Lt-Col J M Shah, I M S, for permission to use the hospital records.

## DISCUSSION

Dr M G Kini (Madras) reported a case of chest injury of a man who was stabbed in the back in the year 1926 in Calcutta during the communal riots. He was taken to the hospital where the wound was sutured but no attempt was made for the removal of the broken blade of the knife. The patient had kept good health until two years before admission when he began to develop a cough with small bouts of haemoptysis which gradually weakened him and the last haemoptysis was so severe that he got himself admitted to the hospital. X-ray showed the broken blade of the knife in the chest.



Fig 1 Lateral view



Fig 2 A. P View

To control the haemoptysis pneumothorax was done in the Tuberculosis department. Later on an exploration was done after removing the second, third, fourth and fifth ribs. On opening the pleural cavity a glary looking fibrinous material was removed and on exploration the lung was found to be collapsed but it was difficult to locate the blade. So the thoracic cavity was closed with a drain. The patient had a stormy recovery. At the time of speaking, Dr Kini said that he was not sure whether the patient was alive or dead. He asked one of his colleagues who had come from Waltair whether the man was alive or if any further attempt was made for the removal of the blade.

Dr Kini reported also a case of gun shot injury due to a rifle bullet which accidentally went off while the patient was on guard duty. The entrance wound which was small with charring was just below the middle of the left clavicle and had caused comminuted fracture of the clavicle. The exit wound was just above the spine of the scapula with lacerated edges. The patient was shocked and due to haemothorax respiration was embarrassed. On admission he was given plasma, the wound was covered with a thick pad to prevent suction of air. He was explored after recovery from the shock. The two wounds were connected across the top of the shoulder and all lacerated muscles which were suspicious were cut away and a complete debridement was done. It appeared as if the bullet had, after striking the middle of the clavicle, traversed behind the scalene muscles in front of the first rib in between the fascia and the apex of

the lung. The brachial plexus was found covered with a lot of clot. It was thought not désirable to prolong the operation to explore the plexus. By some luck, the sub-clavian artery had escaped injury. All the suspicious and devitalised portions of the muscles were cut away and sutured wherever it was possible and then the wound was freely plastered with Streptocide and drained in the most dependent part and the limb was put in abduction at right angles with the shoulder in external rotation and the elbow at right angles and supported by plaster of paris jacket and abduction splint. The patient made an uneventful recovery and before discharge from the hospital at the end of two months, the nerve recovery was found to be slow but there were signs of recovery of the common flexors and common extensors of the fingers and short muscles as shown by recovery of movements at metacarpo-phalangeal and inter-phalangeal joints.

**Dr R N Cooper (Bombay)** As far as possible a conservative attitude was followed because the type of cases encountered at the K E M Hospital were of such nature. Repeated aspirations were employed in cases of hæmothorax. Open drainage was not encouraged routinely in all cases of thoracic injuries. The value of a blood-bank and plasma-storage was emphasised. A case was reported where about four transfusions were done pre-operatively in a practically moribund case before a surgical exploration could be undertaken. Two further blood transfusions were done post-operatively. The quantity injected each time was between 300 cc and 350 cc.

**Dr. R. Mahadevan (Vizagapatam)** My remarks are from observations derived from some cases of injuries of the chest that were under my care.

**Case 1**—A Naval Rating walked up to the wards with an injury to the chest wall of 4 hours' duration. It was caused by some splinters from a bomb which crashed near the deck where he was working. The patient was inclined to think that there was nothing serious with him. He said he came just because his doctor insisted on his reporting to hospital. Examination showed a small lacerated wound in the left 7th interspace in the posterior axillary line. However, a large area around looked swollen and oedematous. His temperature was 100°, and pulse rate 110. The wound was immediately excised and the margins enlarged for exploration. Very extensive laceration of all the muscles of the chest wall, right up to the sternum in front and to the outer margin of the erector-spinae muscles behind was found. In fact, the muscles under the scapula were practically pulped. Wide excision had to be performed to avoid the danger of gas gangrene, and the area of muscles excised was the size of both the palms put together. Yet there was no injury to the ribs, scapula or intra-thoracic structures and this was a very striking feature. Small metal fragments found during the operation were removed. The wound was dusted with sulphonamide powder and left wide open loosely packed with flavine gauze. He was evacuated from the hospital 8 days later in good health. The following points are worthy of note in this case—(1) The wound, though very extensive, had little effect on the patient, who himself thought that there was practically nothing the matter with him. (2) The ribs, scapula and intra-thoracic structures escaped injury, in spite of the extensive pulping of the muscles. (3) Had the wound been considered as one that could be safely watched with some dressings and administration of sulphonamides, gas gangrene would almost surely have supervened.

**Case 2**—Refers to a Sepoy, who, in a practice démonstration purporting to show the methods of taking shelter in shallow trenches in active warfare, hunched his back up, hiding his head below like the proverbial ostrich. The consequence was, he was thereby accidentally shot through the back. When he was brought to the hospital he was exsanguinated and intensely shocked. Before he could be operated on, he had to be given a blood transfusion. A wound involving extensively the muscles of the back was then excised, and a small tear of the pleura found in the depths of the wound was sutured.

Several more blood transfusions had to be given before he rallied. In this particular case, though the pleural cavity was opened up, it was not a factor of much importance. What he required and what saved his life was the repeated blood transfusions that overcame the effect of blood loss and shock.

Case 3—Fig 1 shows a case of simple fracture of the 4th rib with an unsuspected pneumothorax which shows the importance of routine skiagrams in these conditions. The presence of surgical emphysema is also well shown in the skiagram.

Case 4—Refers to an adult who had multiple stab wounds of 3 hours' duration, one of which penetrated the left pleural space. The tear in the pleura admitted a finger easily and the lung was collapsed. There was no haemothorax or foreign body. With positive pressure anaesthesia the lung expanded. The wounds were all attended to on ordinary surgical principles, but I did not feel quite sure if the pleural cavity should be drained or not. The external wound was very septic and was excised. If the pleural cavity should be drained at all, commonsense dictated it should be drained through the most dependent part by a separate clean incision. However, I thought it to be too drastic a measure at the time and adopted a compromise, viz, suturing the tear around a corrugated drain that led into the pleural cavity, and leaving open the wound in the parietes loosely packed with flamine gauze. The whole thing was well covered with strappings. The course of events proved, however, that the compromise was bad. It was difficult to keep the wound air tight and the lung repeatedly collapsed. This occurred even as late as the 8th day. The patient was in distress, curiously and mainly complaining of *dysphagia*. On introducing a needle into the pleural cavity some air escaped and the patient had considerable immediate relief. This procedure had to be adopted more than once. Thus, on the 4th morning after the operation, when his discomfort increased the intra-pleural pressure was plus 20 cms water. 400 c.c. of air was drawn off when the pressure fell down to -4 cm. water and the patient again felt comfortable. Yet, the subsequent course was not smooth. The diagrams attached bring out the points. Massive collapse of the lung occurred (Fig 2). Later, a pleural effusion also developed (Fig 3) which fortunately did not get infected. No aspiration was done either, as the patient developed no symptoms. He ultimately recovered. Skiagrams (Fig 4) taken 11 months later shows the almost normal condition, except for a slight peaking of the diaphragm, the only evidence of old inflammation and adhesion. Here, one important point is worthy of being drawn particular attention to. The skiagram (Fig 3) shows apparently only a small fluid collection, but a fluid collection sufficient to obliterate the phrenicocostal sinus and reach up to the horizontal level of the dome of the diaphragm will amount at least to 10 ounces.

The inferences from the above case are as follows —

It was quite wrong to have drained the pleural cavity through the original wound by a corrugated drain. It was not possible to keep the wound air tight and so the lung repeatedly collapsed. I now think that the tear in the pleura must have been sutured completely and the wound in the parietes packed with gauze and strapped air-tight. If the course of events warranted it, the pleural cavity could have been drained later. Alternatively, at the primary operation itself the pleural cavity must have been drained through a separate wound, excising portion of a rib at the most dependant part and arranging for under-water drainage. This perhaps would have been the better procedure. If the chances of infection seemed remote an intercostal drainage at the most dependant part would perhaps have equally well served the needs of the case. That the patient mentioned above, ultimately did well even though the principles outlined were not adhered to, is no argument in favour of the treatment adopted in the particular case. For, it was quite on the cards that the effusion might have got infected, with all the

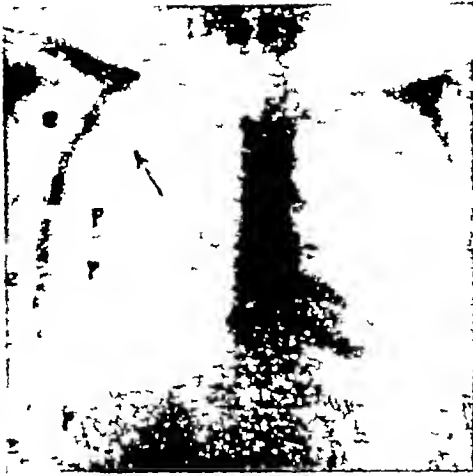


Fig 1 Fracture 4th rib (case 3) (arrow mark) with an unsuspected pneumothorax (p) and obvious surgical emphysema (e).

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Fig 2 Skiagram of chest of case 4, eleven days after injury, showing collapsed of left lung Left dome of diaphragm is pulled up and the heart is pulled over to the left Note also the small pocket of air in the pleural cavity (arrow mark), a remnant of the pneumothorax that had occurred

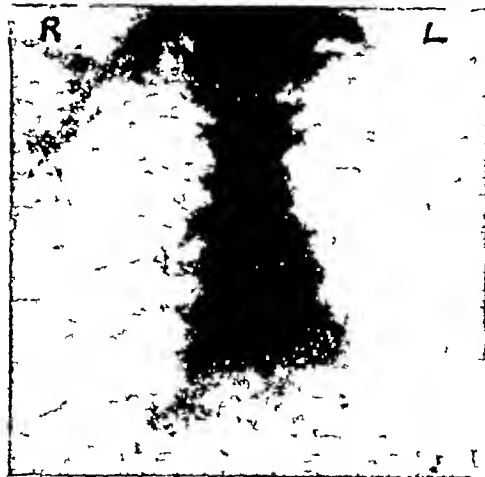


Fig 3 Skiagram of same case as fig 2 (case 4) 24 days after injury Note the fluid collection in left phrenico-costal space



Fig 4 Same case as fig 3 (case 4) showing condition a year later which is practically normal except for the slight peaking of the diaphragm (arrow mark)

dangers of an empyema. A peculiar feature noted in this case was, that every time the lung collapsed, the patient complained of and worried about difficulty in swallowing. Possibly the positive pressure not only caused shifting of the mediastinum but also produced in its wake kinking of the esophagus. He of course had dyspnoea, but this did not seem to upset him so much as the dysphagia.

**Case 5**—Refers to an adult who had a gun shot injury of the right chest penetrating the pleural cavity. Debridement of the wound, suture of a tear in the pleura and blood transfusion led to recovery, but his temperature chart showed how aspiration of some small quantities of blood every time resulted in bringing down a swinging temperature to near normal. After the third aspiration the temperature kept normal. Though the patient was running a temperature in between these aspirations, culture of the aspirated blood proved sterile every time. This shows that a small quantity of blood in the pleura, even in the absence of infection, can account for persistent and even high temperature. It must be said however that the patient was on M & B 693 tablets all the time and how far the beneficial effect was due to it and how far it was due to the aspirations it is difficult to say.

**Case 6**—A man of 35 came with a discharging sinus in the left 1st inter-costal space just below the middle of the clavicle. Eleven months previously he sustained a stab wound and within a few hours of the accident the wound was attended to and sutured up in a local hospital. A fluctuant swelling occurred over the sutured area. This was incised on the 13th day when dark blood and some pus escaped. He was in the hospital for 2½ months but the wound did not heal and he was discharged with a persisting sinus. He was attending thereafter as an out-patient. Pus used to get pent up now and again resulting in high fever, breathlessness, pain in sternal region and anorexia. He had no cough and the loss of weight was slight. This state of affairs recurred often and eleven months after the original injury he reported to this hospital. Skiagrams of the chest taken before and after lipiodol introduced through the sinus brings out clearly the existence of a big empyema (Figs 5 to 7). This was drained at the most dependant part and a large drainage tube was introduced. He rapidly got better. The interesting thing was that the pus on staining showed in addition to streptococci, diplococci, and micrococci, tubercle bacilli also. Very likely he had a latent tuberculous focus, which flared up consequent on his resistance being lowered by the chronic empyema, or more likely a latent tuberculous focus had burst into the empyema cavity. He had no cough. It is worth pointing out here that a chronic non-tuberculous empyema may become tuberculous in the course of time. This can be found out only by periodical examination of the pus and biopsy of the thick wall of the empyema cavity.

**Case 7** is that of an old man who fell from a height and sustained multiple injuries. He had fractures of several ribs on both sides (Fig 8), Colles's fracture and fracture of the humerus. He was intensely shocked and dyspnoeic and had surgical emphysema. Air entry on the left side was poor. A needle was introduced under local anaesthesia into the pleural cavity but no air escaped. It was connected to a manometer, which showed a negative pressure and there was oscillation with respiratory movements. The fractured ribs and other fractured areas were infiltrated with 2% novocaine and the patient became immediately comfortable. Next day the patient had increasing dyspnoea and rapid pulse (respiration 38, and pulse rate 142). A needle now introduced into the left chest showed plus 4 cms water pressure, 300 ccs of air was drawn and the needle was left in place connected to under-water drainage. The needle was removed when he got better, but the process had to be repeated on the 3rd, 4th and 5th days also, leaving the needle in place, hours at a time. He was very ill for several days and only on the 14th day did the respiratory and pulse rate come down to near normal. Ultimately he recovered.



Fig 5 Plain X-ray of chest of case 6, eleven months after a stab wound of left 1st interspace,



Fig 6 Same case as Fig 5 after introducing lipiodol through the sinus in the 1st interspace. Note the lipiodol in the depths of a big empyema cavity.

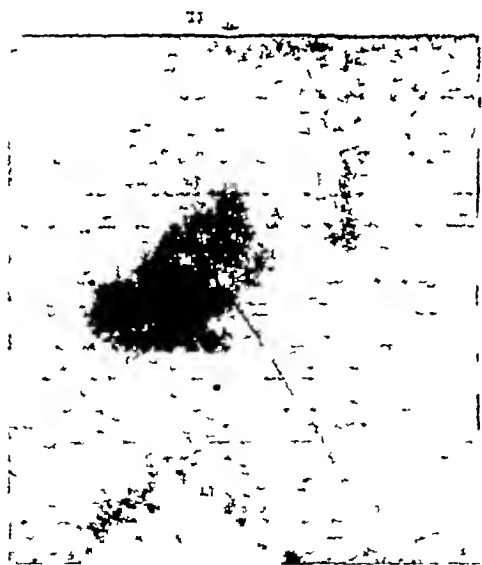


Fig 7. Same case as Fig 6 lateral view. The pus in this case contained tubercle bacilli and various secondary organisms.

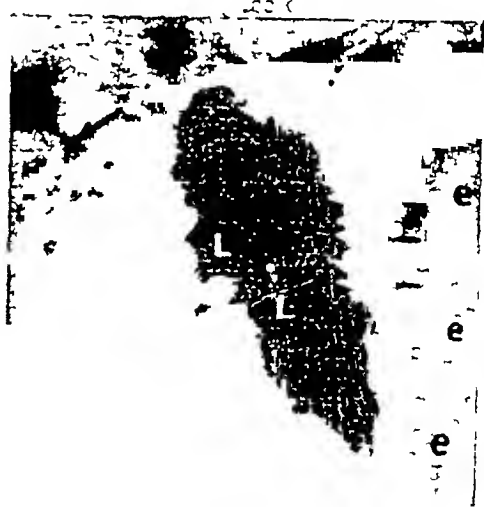


Fig 8 Multiple fractures of several ribs both sides (arrow mark), fracture left humerus; pneumothorax on left side with collapse of lung (L) and surgical emphysema (e).

The dramatic relief the patient had soon after injecting novocaine into the areas of fractured ribs is worthy of note. The treatment of fractured ribs by novocaine injection deserves special mention. The basis of this treatment has been explained as follows (Neal Smith, 1942). The pain in fractured ribs is not due to the rubbing together of the fractured ends, for if this were so the pain must be at its maximum at the height of expiration. This however is not the case. It is well known, that the pain increases during the inspiratory phase and the inspiration suddenly stops with a catch. This is due to spasm of the intercostal muscles at the fractured area. This spasm is abolished by novocaine injection at the fractured area or what amounts to the same, by blocking the related intercostal nerves. I have tried both the methods in a few cases and in all of them dramatic relief resulted. The effect lasts not merely for a few hours, but for several days, so that it practically amounts to a permanent cure. In some cases, however, the patient did complain of pain on the second or third day and a second novocaine injection was required. In the case referred to above, after the 2nd injection he was perfectly free from discomfort so far as the fractured ribs were concerned. The time honoured treatment of strapping the chest wall for fractured ribs has several disadvantages. (1) Even with proper strapping the relief is not always complete. (2) The strappings often get loose and cease to serve the object intended. (3) If firmly strapped, especially in the elderly, the respiratory excursions and coughing may be so interfered with that the patient is unable to cough up the secretions. Inflammatory complications of the lung may therefore arise.

It seems logical, that proctocaine injection may give a more lasting effect than novocaine, and I have injected proctocaine in some cases. However, the cases so treated are too few to come to any definite conclusions. It has been suggested by some that alcohol may be injected. This should never be done. After alcohol injection, neuritis of intercostal nerves may result, a condition much worse than the original malady itself.

In conclusion it may be pointed out that —

(1) A very serious injury may underly an apparently trivial injury to the chest wall.

(2) Blood transfusion has a very definite life saving value in selected cases.

(3) A routine skiagram is required in all but the most trivial injuries.

(4) If drainage of the pleural cavity is required, it is better drained through a separate incision in a dependant part of the pleural cavity and not through the main wound.

(5) A small haemothorax, though sterile may give rise to persistent swinging temperature for a number of days.

(6) A case is reported of a persistent discharging sinus after a stab wound and the underlying cause was a big empyema. The infection was mixed, in which tubercle bacilli also were found. The significance of the tuberculous infection in the case is discussed.

(7) Treatment of fractured ribs by novocaine injection at the fractured areas or of the related intercostal nerves appears to be the best. Strapping the chest wall probably does more harm than good and is better abandoned. In fact the advantages of the former are so great and the discomforts of the latter so much that I feel quite justified in being dogmatic and say that treatment of uncomplicated fractures of the ribs must be only by novocaine injections of fractured areas.

My thanks are due to Major F. A. B. Sheppard, O.B.E., I.M.S., Superintendent, King George Hospital, for permission to publish these cases, to Dr K. G. Krishnaswami for utilising his case (case No 5), and to Dr. G. V. Benjamin the Radiologist for reprints of skiagrams

### REFERENCE

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Dr S. B. Gadgil (Bombay) Dr Patel in his paper has not made clear some of the symptoms and clinical signs as regards stab wounds of the heart. After stab wounds of the heart patient is collapsed for a time, his pulse is weak he suffers from shock. He then recovers, he may carry on his work, he may climb up a couple of stairs of a building and then drop down dead. His symptoms resemble those of a patient suffering from extradural haemorrhage after an injury. A period of unconsciousness followed by recovery to a certain extent then again unconsciousness. After heart wounds there is no bleeding for a time due to shock. About 100 to 200 c.c. of blood must collect in the pericardium before signs of tamponade of heart become manifest. The patient may run or may continue to fight during this period. Tamponade causes cerebral anaemia due to diminished arterial pressure and leads to coma; venous pressure is increased from 3 to 4 c.c. of water (as shown by a water monometer) to 13 to 14 c.c. This will account for his temporary excitability. There is pallid cyanosis of lips and tongue and a probe put in the wound will pulsate.

Dr A. V. Baliga (Bombay) gave some figures regarding the incidence, varieties and results of Thoracic injuries admitted to the wards of the K. E. M. Hospital, Parel.

Dr C. P. V. Menon (Madras) stressed the importance of first aid measures particularly with regard to sucking thoracic wounds. He pointed out the importance of accurately localising foreign bodies and mentioned a case in which the absence of such localisation very nearly resulted in an unnecessary thoracotomy. He referred to two cases of abdomino-thoracic injuries in one of which a hernia through the diaphragm was associated with wounds of the spleen and left kidney, these latter were not noted at the time of the operation and led to a fatal termination.

Dr. G. D. Kapur (Lahore) My remarks apply only to injuries of the chest as met with in Civil practice and I would like to lay emphasis on two points. (1) That with the exception of sucking wounds which are to be immediately dealt with most chest-injuries, when watched will eventually develop into definite pathological entities, demanding a definite line of treatment. For example, haematoma indicating aspiration, empyema indicating drainage and so on. Exploration or active surgical interference as is sometimes indicated in abdominal injuries has little place in chest injuries. Conservatism gives better results than radical surgery. (2) The Surgeon is handicapped in the elicitation and interpretation of physical signs in the chest. The combination of high technical skill with highly developed clinical acumen is not very common. To do justice then, he must have the assistance of a physician to properly evaluate physical signs. To illustrate this difficulty, I would quote a case of a penetrating wound of the left lower chest inflicted with a spear. The patient was dyspnoic and cyanotic. The heart was displaced to the right and the left chest was hyper-resonant on percussion and curious sounds thought to be amphoric were auscultated. I ascribed the condition to tension pneumothorax, and put in a needle to allow the excessive pressure to diminish. The distress however persisted and the patient eventually died. The death was put down to tension pneumothorax. As the case was a police case a postmortem had to be done and it was dis-

covered that the spear after traversing the pleural cavity had penetrated the tendinous dome of the left diaphragm. The stomach had herniated through into the left pleural cavity completely collapsing the left lung and pushing the heart to the contralateral side.

Dr Patel briefly replied to the points raised in the discussion.

The President in concluding the discussion paid a tribute to the exhaustive manner in which the opener had dealt with the subject and to the interest evinced in the discussion which followed.

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# A CASE OF FOREIGN BODY IN THE ESOPHAGUS

BY

RAI BAHADUR DR H C GUPTA, FRCS,

CIVIL SURGEON, HAZARA, ABBOTTABAD, N W F P.

Mir Zaman, Mohammaden, male, aged about 30 years, was admitted in the Civil Hospital, Abbottabad, on the 5th April 1944, with difficulty in swallowing and constant dull aching pain at the region of the xiphisternum. He gave a history of swallowing a dental plate about two years back. X-ray plate showed impaction of the plate at the cardiac end of the esophagus at the level of the cartilage between X and XI Dorsal Vertebrae. On screening after barium meal the esophagus showed slight dilatation and retroperistalsis and after a few moments the meal trickled down into the stomach.

The patient had applied for treatment at the local Hospitals in the neighbourhood and had even been to Bombay. He was refused operation and was passing his days in agony.

Being a general surgeon and not equipped with special instruments like the esophagoscope, etc. I thought it should be possible to remove the plate through the stomach, if necessary, after breaking the plate with a strong clamp.

After explaining to the patient all the pros and cons of the operation, to which he easily submitted, the operation was decided upon.



Fig 1 X-Ray of the foreign body

Fig 2 Photograph of plate removed.

Transverse laparotomy was done on the 17th April, 1944, along the trans-pyloric plane. It was possible to locate the plate near the cardiac end of the esophagus by passing the finger upwards along the lesser curvature of the stomach. The stomach was opened as high as possible on its anterior

surface and a clamp was passed upwards towards the cardiac end, being guided by the left hand localising the plate from outside the stomach near the diaphragmatic opening of the esophagus. The manoeuvre was not so easy as it looked. After a few minutes' struggle it was possible to get hold of the plate with the clamp and, with a slight pull, to remove it. The stomach was closed by double purse string catgut stitches and the abdomen closed in layers.

The patient made an uneventful recovery and stitches were removed on the 11th day, i.e., on the 28th April, 1944. The patient could now swallow solid food without any difficulty.

The case is interesting on account of the long history and the method of treatment adopted.

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# THE SINGLE CARTILAGINOUS EXOSTOSIS AND THE INDICATIONS FOR SURGICAL INTERFERENCE

BY

DOZENT DR GEORGE POLITZER

*From the Princess Surrendra Kumari Memorial Central  
X-Ray Institute, Patiala.*

The simultaneous occurrence of multiple cartilaginous exostosis and enchondromata has been observed in many cases during the last decades. After the discovery of the X-Rays Kienboeck returned again and again to this interesting chapter of bone and joint disease. The stress laid on the multiplicity of the cartilaginous exostosis was instrumental in forgetting that in a great number of cases the bone changes are confined to one single area. These single cartilaginous exostosis show a rather typical localisation. They start from the distal metaphysis of the femur one or two inches above the epiphyseal scar. They mostly originate from the lateral side of the shaft and only occasionally as in Fig 1 of this paper from its medial surface. We find these changes far more often than generally expected as they usually do not cause any clinical symptoms, but are detected only during an X-Ray examination performed for some other reasons as, for instance, traumatic injury to this area or rheumatic pains in the knee joint. Knowledge about some important features of these exostosis is important for the surgeon too, as there are strict indications for surgical interference, if one or the other complication occurs.

The typical cartilaginous exostosis consists of a conical bone stick growing out of the metaphysis of the bone in a proximal direction. The end of this stick carries a globe shaped cartilaginous body, which, itself is crowned by loose connective tissue, in which occasionally a typical bursa may develop. Fig 1 shows a cartilaginous exostosis of the type just described. The cartilaginous extremity is not visible as cartilage and muscular and fibrous tissue surrounding it offer the same density to the penetrating X-Rays, so that the limits between the above tissues are not marked by any contrast. In the histological picture of a section through such a cartilaginous exostosis (Fig 2) the spongy bone (S B) is covered by a cap of cartilage (C) whose structure is rather irregular. These cartilages forming the extremity of the exostosis are subject to metaplastic changes in their structure. Often the whole cartilage is substituted by bone (but for a microscopical layer on its utmost extremity). In this case the exostosis becomes visible in the X-Ray picture in full as for instance in Fig 3. In other cases parts of the cartilage degenerate, a process which leads to incrustation of the decaying material.

with lime salts. The structure of these calcified islands of the bone is dense and homogenous. Thus the extremity of an exostosis may consist of cartilage, bone and secondarily calcified necrotic cartilage. This leads to the

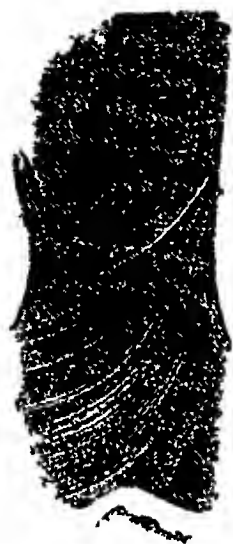


Fig. 1. Cartilaginous exostosis with cartilaginous extremity thus not discernible in the X-Ray picture



Fig. 2. Microscopical section through the extremity of a cartilaginous exostosis. C Cartilage, S B. spongy bone

variety of structures observed in cases like Fig. 4, in which the dense homogenous part corresponds to necrotic and encrusted cartilage, the trabecular structure to bone and the "defects" to cartilage, as, for the above reasons, cartilage cannot be distinguished from other soft tissues and appears thus as a defect in lime containing surroundings. In adults the mushroom-shaped exostosis is the usual manifestation of this malformation. But in the growing individual the form is often that of a half globe as shown in Fig. 6, whose detailed description will follow later on. The cartilaginous exostosis is occasionally found in other parts of the human body too, but wherever it may occur one rule is followed with greatest meticulousness—the exostosis grows always in the direction towards the middle of the shaft, thus an exostosis of the distal metaphysis will grow proximad, while one of the proximal one will be directed distad,

As already said before the cartilaginous exostosis are discovered mostly by mere accident, the best proof, that they are usually not causing



Fig 3 Cartilaginous exostosis with ossified extremity



Fig 4 Cartilaginous exostosis whose extremity consists partly of cartilage, partly of bone and partly of calcified areas without structure corresponding to lime deposits in necrotic cartilage

any kind of clinical symptoms. The main reason, why they are considered as no object for surgical interference is, on the one hand, the absence of any troubles to the patient, on the other, the well known fact that they show practically no inclination towards malignant degeneration. It is also rather probable that the surgeons, fed on the knowledge that the cartilaginous exostosis is part and parcel of a generalised disease of the skeleton, are reluctant to interfere in one area, when apparently so many others are bound to be affected in the same way now or later. It has been mentioned already above, that this assertion is not based on realities, as the cartilaginous exostosis is very often the malformation of a single area only and does not involve the skeleton as a whole. The following paragraphs shall be devoted to the three main indications for surgical interference, out of which the first is self-explanatory, but the second and third are based on observations which are not common knowledge so far.

No 1 In some cases the cartilaginous exostosis stretches and protrudes the surrounding tissue to an extent that the skin becomes thin, smooth

and shiny (atrophy of the skin) In some of these cases the endings of the nerves may be compressed too, so that pain occurs. That these changes of

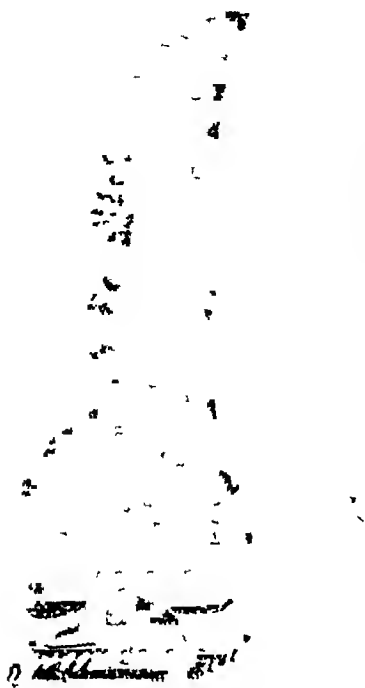


Fig 5 Fractured cartilaginous exostosis

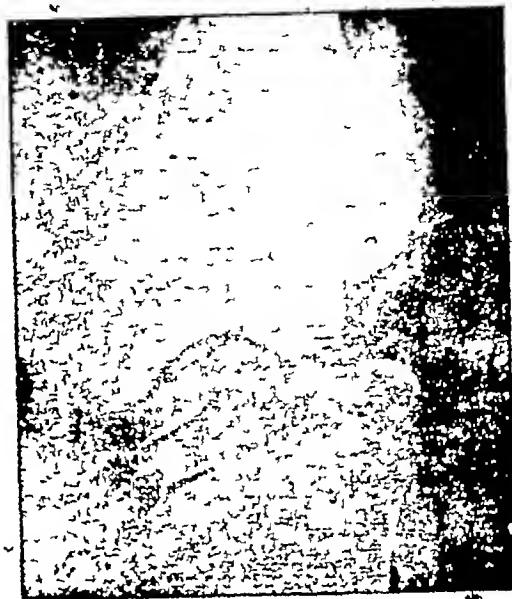


Fig 6 Cartilaginous exostosis with secondary subluxation of the knee joint

the skin are not observed more often, is due to the fact that just at the place, where we usually encounter the exostosis (distal end of femur) the covering of muscles and fat is so thick, that the exostosis hardly obtains a size sufficient to touch the skin. In case of occurrence of pain and changes of the integument operation is indicated.

No 2 Sometimes we find that the cartilaginous exostosis is broken in two, usually at the thinnest part of the stalk. Often a recent or an old injury can be traced in the anamnesis, but sometimes we fail to detect the history of the fracture (Fig 5). In these cases secondary changes are to be found which are of great clinical importance. The free fragment of the exostosis is involved in continuous displacement by muscular action, while the rough surface of the fracture causes chronic irritation of the surrounding tissues. This leads to secondary inflammations of the muscular tissue and often of the nerves crossing the area of the fracture. If pain occurs and patients are confined to bed, scar tissue is formed, which may ensheath the nerves and cause neuralgic pain, even when the acute symptoms have already disappeared. Still more astonishing are the changes which are found occasionally around the extremity of the broken exostosis. It has been mentioned already that the end of the exostosis is covered often by a bursa. After fracture this bursa responds with bursitis or even with severer changes as I

happened to observe in one case. The inner surface of the wall of the bursa developed metaplastic tumours in great number, which consisted of connective tissue, cartilage, blood vessels and necrotic areas densely encrusted with lime deposits. The changes were identical to those found in the so-called "multiple joint capsule chondromata or joint-capsule-chondromatosis," a rare disease of the knee-, elbow- or shoulder-joint. These consequences of the fracture of the cartilaginous exostosis make it imperative to operate on each and every case of cartilaginous exostosis, which is found to be fractured after fresh injuries as well as after old ones, although in the latter case the operation may be technically not all too easy in view of the secondary cicatrization of the surrounding tissue.

No 3 Another interesting complication is exemplified by Fig 6. Large and bulky exostoses lead often to a displacement of the tendons of the surrounding muscles. They form a pulley forcing the insertion of the muscle into a devious course. They thus act on the joint in a wrong direction leading suddenly or by slow action to a subluxation of the joint. In these cases the cartilaginous exostosis is to be removed immediately, as otherwise the abnormal juxtaposition of the joint constituents does no longer return to the normal even after surgical interference. The reason for this ineffectiveness of a late operation lies in the fact, that this complication occurs in juvenile patients mostly where the facets of the joint can still be moulded into a new shape by an abnormal function and are thus no more completely fitting after a return to their normal position. These cases often develop after operation a secondary arthrosis deformans which is incurable. Thus it is imperative to remove immediately a cartilaginous exostosis which tends to subluxate the adjacent joint.

### Conclusions

No 1 Although the cartilaginous exostosis are often part and parcel of a generalised deformity of the skeleton, the same changes are often found in one area only (single cartilaginous exostosis).

No 2 The radiological features of the exostosis depend on the metaplastic changes in its cartilaginous extremity, which may either be ossified or encrusted with lime salts after the appearance of local centres of decay.

No 3 The following indications for surgical interference have been established

- a Damage to surrounding tissues as nerves and skin
- b Fracture of the exostosis
- c Subluxation of the adjacent joint by devious course of tendons and muscles caused by the presence of large and bulky exostosis

# CONGENITAL DIVERTICULUM OF THE BLADDER

BY

S ACHAYYA, M B B S ,

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Diverticula of the bladder may be of two types, (1) Congenital and (2) Acquired

Congenital diverticula are of rare occurrence and according to Swift Joly, the treatment of large vesical diverticula is one of the most difficult problems the Surgeon has to grapple with. Acquired diverticula are pouches of mucous membrane herniated through deficiencies in the muscular wall of the bladder in cases of lower urinary obstruction, and the treatment is that of the obstruction. It is said that congenital diverticula do not give rise to symptoms before middle age and the cystitis and obstruction which brings the patient for treatment at that stage is often associated with enlargement of the prostate.

In 14 cases reported by Swift Joly (1923), the youngest was 37, and the others between 50 and 72. Ogier Ward (1938) published a report of 53 cases and in this series the average age incidence was 57 years, the youngest being 15, 3 others between 30 and 40, and 10 between 40 and 50. Keynes and Morel's (1943) case was 25. In the case reported below the patient was 18 years old at the time of operation and had had symptoms for 6 years.

The complications that may occur are (1) Cystitis which leads to dense perivesical adhesions. (2) Obstruction due to pressure of a large inert sac on the ureters and the bladder neck. (3) Stone formation in the bladder and in the diverticulum. (4) New growth—papilloma or carcinoma at the neck of, or within the sac.

No set operation is suitable for all cases. The operations described are (1) Excision from without the bladder—often facilitated by pushing a finger within the sac. This was the method used in our case and is particularly suited for diverticula situated high up on the fundus, posteriorly or in relation to the urachus. (2) Splitting the bladder wall down to the orifice of the diverticulum—the incision encircles the orifice and the diverticulum is then removed. Swift Joly says this method is dangerous as the ureter is in close relation to the posterior wall of the sac and is liable to be injured. Ogier Ward, however, performed the majority of the operations by this method. (3) Intra vesical operations by invagination of the diverticulum into the bladder is only suitable for small diverticula, and the outer surface must be cleared of all adhesions before invagination. (4) Keynes and Morel did a purely extra vesical dissection, isolated the

diverticulum, removed it by incising at the neck and closed the opening in the bladder. An indwelling urethral catheter was used to drain the bladder.



Fig A. Intravenous Pyelogram 15 Minutes



Fig B Cystogram



Fig C Intravenous Pyelogram. 17 Minutes

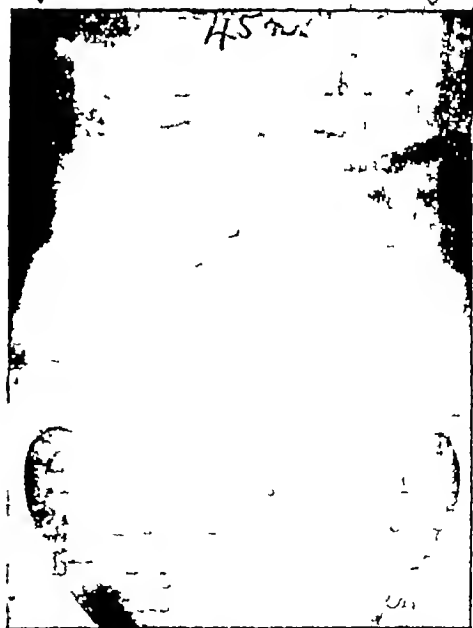


Fig D. Intravenous Pyelogram 45 Minutes

This method which does away with supra-pubic drainage reduces the period of invalidism and can be used in cases where cystitis is not severe.

Swift Joly condemns preliminary cystostomy as dangerous. The bladder contracts around the indwelling catheter and the opening of the diverticulum closes and the urine in the inert sac which is already infected forms a bag of pus which makes subsequent operation difficult and dangerous. If, however, the catheter is led into the diverticulum and drains it, the sac can be washed out and in our case certainly improved the cystitis. If the case is complicated by prostatic or urethral obstruction both conditions should be treated at the same sitting. When, however, the condition of the patient does not permit this, it is better to remove the diverticulum first and treat the obstruction later. The presence of a calculus in the bladder or in the sac is an indication for excision of the diverticulum. Even after the passage of a catheter, the diverticulum does not often empty completely and this urine which is often of considerable amount is termed by Joly, 'Concealed residual urine', and can be demonstrated in cystograms taken after filling the bladder with an opaque medium and evacuating the contents by catheterisation. The presence of 'concealed residual urine' vitiates all tests of renal efficiency carried out on bladder urine and so, to get a correct estimate of renal function, the ureters must be catheterised or a blood urea estimation relied on.

### Case Report

M—, Hindu, male aged 18 years was admitted into the Government General Hospital, Madras on 28-3-1944

His complaint was that for six years he had noticed that on micturition the bladder did not empty completely, and that he had to exert pressure over it with the hands to complete emptying. There was no difficulty in starting micturition nor did he have to strain to pass urine. He complained of fever with rigor coming on every 3 or 4 months for 3 or 4 days during the last two years.

*On Examination*—The patient was a well-built adult, very anaemic. The bladder was distended up to the umbilicus. There was fullness and tenderness in the right loin but the kidney could not be palpated. The Spleen was enlarged five inches below the left costal margin. There was no abnormality of the nervous system.

*Investigations*—(1) A rubber catheter was passed easily and on partially emptying the bladder, two lobes were felt—on either side of the middle line. The lobe to the left emptied first and after it was completely empty, the lobe to the right started emptying.

(2) *Urine*—Turbid, foul smelling, alkaline, sp gr 1010, pus cells and bladder epithelium present.

*Culture*—B coli grown

(3) *Blood Urea*—28 mgs %

(4) *Urea clearance*—22.8%—19.2% Std Clearance

(5) *Skiaogram of lumbar and sacral spine*—showed a bifid first sacral spine

(6) *Intravenous pyelogram*—Bilateral hydronephrosis and hydroureters—more marked on the right side, with delay of first appearance of dye to 45 minutes on the same side (Fig A)

(7) *Cystogram*—The bladder was filled with 10% NaI and was found to have a capacity of one pint. The antero-posterior skiagram showed two rounded shadows—one superimposed on the other (Fig B)

On 11-5-1944 *Cysto-urethroscopy* was performed under Spinal anaesthesia (2 c.c. 7½% ethocaine). The bladder did not empty under Spinal anaesthesia thus ruling out the possibility of sympathetic over-activity causing retention. No urethral valves were visualised. The bladder mucosa showed cystitis. The left ureteral orifice was much dilated. The right ureteral orifice could not be visualised.

Suprapubic cystostomy was then done and on exploring the interior of the bladder with the finger, an opening of a diverticulum to the right and posteriorly was felt. The opening was about 1½ inches in diameter, with sharp well defined edges.

The bladder was drained suprapubically—the D'pezzier catheter being led into the diverticulum. The space of Retzius was drained and the incision closed. The bladder was drained continuously and bladder washes given daily. After a week of this routine, the urine became considerably clearer but *B coli* was again grown in culture.

On 23-5-1944 Surgeon Dr C P V Menon—under spinal anaesthesia, the bladder was exposed by a 5 inch subumbilical mid line incision. The peritoneum was pushed up. A very large thin walled diverticulum extending backwards and to the right and about twice the size of the bladder was dissected out. During the process the peritoneum which was very adherent was accidentally opened. This was immediately sutured, leaving a very small area adherent to the fundus of the bladder proper. The right ureter was found to open into the diverticulum about one inch beyond its communication with the bladder. The ureter was divided. The neck of the diverticulum about 1½" in diameter was clamped and cut through, the opening being then closed by three layers of sutures. The divided right ureter was then implanted into the bladder proper. The extra vessel space was drained. The bladder was drained suprapubically with a Malecot catheter and the wound closed.

During the post-operative course, there was some sepsis in the wound and the patient ran an irregular temperature for about 10 days and was treated with Sulphonamides by mouth. After two weeks the suprapubic catheter was removed and the bladder drained continuously per urethra. It took about three weeks for the suprapubic wound to close completely and on removing the urethral catheter, the patient found that he could pass urine freely and empty the bladder completely—there being no residual urine on catheterisation, after the patient had passed urine.

The Pathological report on the specimen said that microscopically there was thinning of the bladder wall with inflammatory changes and denudation of the mucous membrane in areas. The muscular wall was intact.

On 14-7-1944 Cystoscopy was again performed under general anaesthesia to view the orifice of the implanted ureter, and it was seen to be functioning well. The cystitis had cleared up. An intravenous pyelogram on 18-7-1944 showed hydronephrosis and hydroureter still present on the right side but the excretion of dye delayed to 45 minutes on the right side in the pre-operative pyelogram now occurred in 17 minutes (Fig C & D).

This is a case of giant diverticulum of the urinary bladder of the Congenital type as shown by the presence of muscle tissue in its wall. There was no obstruction in the lower urinary passages and the diverticulum was causing pressure on both ureters below. Apart from cystitis, there were no other complications like calculus formation or new growth in the sac.

The inability to visualise the opening of the diverticulum into the bladder during Cystoscopy was probably due to its being closed by sphincteric action as is sometimes said to occur

My thanks are due to Lt.-Col. McRobert, I.M.S., Superintendent, Government General Hospital, Madras, and Dr B M Sundaravadanan, F.R.C.S., Surgeon, Govt General Hospital, under whom the case was admitted and investigated for permission to report this case

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#### ABSTRACTS

*Skin Grafting in the Treatment of Wounds* by Archibald H McIndoe, F.R.C.S., F.A.C.S. (*Proc Roy Soc Med*, Dec 1943)

The early application of skin to any raw surface is as important as the early immobilization of a fractured bone. This is true whatever the nature of the wound, and wherever it may occur. Though it is widely believed that the only variety of wound meriting a skin graft is an extensive superficial soft tissue injury with loss of skin, the most important results follow quick healing in compound injuries involving tendons, bones, and joints. It is precisely in the field of orthopaedic surgery that the value of early skin replacement should be fully appreciated and more widely practised. The day has passed when healing of extensive skin losses by scar tissue should be countenanced. Treatment of this sort is a surgical crime. The inevitable results of slow healing, particularly in area of functional importance, are contractures and deformity, deep fibrosis of muscle tissue, obliteration of tendon sheaths, periarticular fibrosis with loss of movement in joints, and decreased excursion and power in muscles. The advantage of quick epithelialization is that the progressive fibrotic organization which constantly occurs in an open wound and in the tissue lying beneath it is immediately converted into a process of resolution and absorption of inflammatory exudate with resultant tissue softening. Intact skin is the only efficient barrier to the entrance of infection.

Provided there are no deep foci of infection established in the tissues and sooner a skin covering is obtained the better. Even if it is a temporary covering to be replaced later by another type of graft for functional or cosmetic reasons, its early successful use will sometimes avoid weeks of pain and suffering, and possibly a lifetime of disability and disfigurement from scar tissue contraction or chronic ulceration.

In both burns and traumatic injuries a skin graft may be applied immediately, or after excision of the wound. In most instances, however, and particularly with burns, delayed grafting is the method of choice after infection has been controlled and a satisfactory granulating surface has been produced. But wherever possible the immediate use of a skin dressing is to be preferred. Ideally the treatment of a wound with loss of skin would involve the immediate regrafting of the actual piece lost after suitably pre-

paring it as a free graft. This is sometimes possible, and is always worth attempting. The paper describes a remarkable case of 6"  $\times$  3" dirty, detached skin being washed and used as a Wolfe graft.

Immediate grafting is determined by the degree of wound infection and this by the time interval which has elapsed since injury. Twenty-four hours is permissible with facial wounds, correspondingly less in the trunk and extremities.

Delayed grafting means the application of a skin covering to a prepared granulating surface. Speed in the preparation of such a surface is essential in order to prevent the excessive formation of that thick basic layer of fibrous tissue which is eventually so crippling from a functional standpoint. Thus a traumatic skin loss, free of sloughs from the beginning and treated by an open method should be ready for grafting in seven to ten days. Granulating surfaces developed under plaster usually require a further five to seven days sterilization though occasionally they may be dealt with immediately the plaster is removed. Practically all third degree burns treated by the saline, sulphanilamide and tulle gras method should receive their initial grafts between the third and fourth week.

*The control of infection and the conditioning of the granulating surface.* It is generally agreed that the quickest method of preparing a granulating surface for grafting is by saline and half-strength eusol pressure dressings applied frequently and atraumatically with tulle gras applications to prevent adhesion of the gauze packs to the delicate proliferating surface (McIndoe, 1941, 1942). This is true whether plaster is used or not. 1% acetic acid alternating with sulphanilamide powder is useful for *B. pyocyaneus* but this organism is difficult to eradicate by any known method. The two organisms to be most feared are a haemolytic *Staphylococcus aureus* and a sulphanilamide-resistant haemolytic *Streptococcus*. Experience shows, however, that it is unnecessary and indeed impossible to produce a surface completely free of all these organisms. What is necessary is to reduce the total bacterial flora to a point where a graft will take. The most reliable guide is the condition of the healing edge and its rate of spread. If this is proceeding normally the graft will almost certainly take. Skilful and devoted nursing carried out under aseptic regime is more important than any magical application from a bottle. Dry-heat, ultra-violet or infra-red lights, silver nitrate pencils or caustics should never be used.

The technique of grafting by the Thiersch method is well enough known, and is nowadays helped by the rubbing of granulating areas with sulphonamide powder, and on this, applying the grafts. Exposed tendons, bones and joints require a fresh blood supply at the earliest possible moment. They must receive rather than give nourishment if they are to survive and with their survival preserve movement and function in the part. Experience shows that the use of a pedicled flap is often too long delayed and that the patient lies in hospital for months on end while unavailing efforts are made to get free grafts to take. Technically flaps are difficult to carry through and should be dealt with only by those skilled in their use. The prime indications for pedicled flaps are exposure of tendons or joints in hand, wrist, elbow, and foot, especially around the heel.

*Comment.* "It cannot be said that there is to-day any lack of technical knowledge as to how a given raw surface should be covered with its appropriate skin rapidly and with certainty, whatever the size of the loss or the nature of the underlying lesion. Nor is there any argument as to the desirability of quick healing. It is noticeable, however, that in orthopaedic injuries insufficient attention is paid to this aspect of the lesion with the result that healing is often grossly delayed and functional results heavily compromised. The orthopaedic surgeon should make himself proficient in the use of the free

skin graft in wound treatment. He should also be fully aware of the limitation of this method and the indications for the more complicated but often more satisfactory methods of skin replacement requiring the help of the plastic surgeon," or, better, his own knowledge of the principles and practice of plastic surgery

N.B.—The first and last paragraphs are deliberate quotations from Mr McIndoe's paper, it was felt that they expressed themselves so succinctly that it was wrong to condense them further

T H S

*Quadricepsplasty to Improve the Knee Function by Lieut-Col T C Thompson*  
(*Journal of Bone and Joint Surgery, April, 1944*)

It must be the experience of all surgeons who deal with injuries of the femur, simple or compound, to be faced with impairment of the movements of the knee

Lt-Col T C Thompson has clarified and stated that the limitation of movement at the knee joint is not so much due to the extra-articular changes round about the knee joint but due to the changes taking place in the quadriceps muscle especially in the vastus medialis, vastus intermedius and vastus lateralis

He has from a study of 13 cases shown that the rectus femoris is generally free, and is not affected by the inflammatory changes as the other muscles of the quadriceps mechanism. He has devised an operation which is very simple and appears very effective

He advocates a skin incision on the anterior aspect of the thigh beginning from the upper third of the thigh to the lower border of the patella. The fascia was divided on either side of the rectus beginning from below and extending upwards and limiting it at the place where the muscle appeared normal. After dissection the rectus femoris which becomes free can be drawn aside. The capsule is divided on either side of the patella extending distally until the contracture of the capsule is overcome. He has stressed that the most remarkable change was fibrosis of the vastus intermedius tendon which attaches the under surface of the rectus femoris and the patella to the anterior surface of the femur interfering with the movements of the knee. He advocates excision of the vastus intermedius completely leaving the fibrosed periosteal covering over the front of the femur. At this stage of the operation he found that the manipulation of the knee to an angle of about 70 degrees well beyond the right angle was possible. The vastus medialis or vastus lateralis are sutured to the side of the rectus femoris if found fairly normal, down to the middle and lower thirds of the thigh. He made no attempt to close the capsule. If the muscles were badly scarred no attempt was advised to suture them to the rectus femoris. In cases where there were old healed sinuses and multiple incisions in either the vastus medialis or the vastus lateralis, the subcutaneous tissue and fat was mobilised and sutured on one or the other side of the rectus femoris in order to produce a new inter-muscular septum and eliminate all the scarred muscle from the remaining quadriceps mechanism. After suturing the skin, the extremity is placed in a Thomas Splint with Pearson attachment to facilitate early movement. He advocates passive and active movements in balanced suspension immediately and found that the recovery was surprisingly rapid.

Bennett recommended quadriceps lengthening operation for similar condition but the pathology described by Lt-Col Thompson has clarified the position. The mobilisation of the rectus femoris, cutting away of the fibrosed vastus intermedius tendon and

reconstruction of the inter-muscular septum and early movements is a departure from Bennett's technique and has accelerated the convalescence and improvement of function

M G K.

*Treatment of Carcinoma of the Prostate (Journal of the Royal Society of Medicine, March, 1944)*

A discussion on treatment on carcinoma of the prostate was opened by Mr Clifford Morson, who limited his remarks to surgical measures only. It was discussed that carcinoma of prostate resembles breast cancer in its tendency to form fibroblasts and to metastasise to bones. The lymphatic spread is to glands in the groin, pelvic cellular tissue, iliac bones lymphatics round the rectum, posterior abdominal wall and then to the vertebrae and thorax. Once the disease has spread outside the prostate gland proper, a radical operation is not possible.

Clinical examination of the patient when considered together with the signs and symptoms including a cystoscopic examination can only be of value in suggesting the possibility of cancer. Only a biopsy can give a conclusive evidence.

It was remarked by one of the speakers that men, dogs and lions are particularly liable to cancer of the prostate and that for various reasons he has only investigated the former two only.

Another speaker remarked that treatment by deep X-Rays has to be given to the whole pelvis. 40 to 50 p.c. patients without known metastasis improve with this treatment but sooner or later the growth recurs or metastasis are formed.

Professor Dodds gave a summary of recent work on the effects of injection of Testosterone and estrogens. The Chairman remarked that he has been impressed by the dramatic result of administration of stilbestrol, beginning with 1 mg t.d.s and working up to 20 mg t.d.s. The largest dose given was 3000 mg in 11 months. About 5 p.c. developed mastitis after getting 500 mg, which is obviated by reducing the dose.

S B G

# Association Notes

## GOVERNING BODY

R N COOPER (Bombay)	—President.
K. G. PANDALAI (Madras)	} <i>Past Presidents</i> ( <i>Ex-officio Members</i> ).
S R MOOLGAVKAR (Bombay)	
L M. BANERJI (Calcutta)	
N. C JOSHIE (New Delhi)	
H HYDERALI KHAN (Hyderabad)	—Vice-President.
C P. V MENON (Madras)	—Secretary
M G KINI (Madras)	—Treasurer

## MEMBERS

- 1 S R JOGLEKAR—Bombay
- 2 V R MIRAJKAR—Lahore.
- 3 A V. BALIGA—Bombay.
- 4 P CHATTERJEE—Calcutta
- 5 M. M CRUICKSHANK—Bangalore.
- 6 K S NIGAM—Lucknow
- 7 S SUBBA RAO—Bangalore.
- 8 N MANGESH RAO—Madras

## The Annual Conference

The VIth Annual Conference will be held in Lahore on 30th, 31st December, 1944 and 1st January, 1945. Rai Bahadur G D Kapur, M S, F R.C S, 5, Lawrence Road, Lahore, is the Local Secretary and all members intending to attend are requested to get into touch with him as early as possible

## Registry of Sarcoma of Bone

It was decided at the last Conference that a Registry of Sarcoma of Bone is to be maintained under the auspices of the Association. Dr V R. Khanolkar of the Tata Memorial Hospital, Bombay, has very kindly consented to make the necessary Pathological study of Specimens. All Surgeons are, therefore, requested to send short but complete notes of cases of Sarcoma of Bones coming under their care to Dr Khanolkar along with X-Ray and Clinical photographs, if any, and a piece of embedded tissue or two unstained slides. It is particularly requested that all Surgeons will co-operate in this endeavour.

## The Library

The attention of all members is invited to the Circular regarding the Library. A separate account has been opened and donations and subscriptions may be sent to the Secretary. Suggestions regarding books and journals to be acquired are welcome. Donations will be acknowledged in the Journal from time to time.

### SUBJECTS FOR DISCUSSION

#### 6th Meeting

##### 1 *Surgery of the Gall Bladder—*

Opener Dr P Chatterjee, Calcutta

Seconder Dr H Hyderali Khan, Hyderabad

##### 2 *Carcinoma of the Breast—*

Opener Dr N C Joshie, New Delhi

Seconder Dr D J Jussawalla, Tata Memorial Hospital, Bombay

##### 3 *Urinary Lithiasis—*

Opener Dr L B Joshi, Karachi

Seconder Dr H L Vaidya, Kathiawar

#### 7th Meeting

##### 1 *Traumatic Surgery of the Skull—*

Opener Dr R N Cooper, Bombay

Seconder Dr G D Kapur, Lahore

##### 2 *Enlarged Prostate—*

Opener Dr S R Moolgavkar, Bombay

Seconder Dr S S Anand, Lahore

##### 3 *Fractures of the Neck of the Femur—*

Opener Dr B N Sinha, Lucknow

Seconder Dr A K. Talwalkar, Bombay

#### 8th Meeting

##### 1 *Carcinoma of the Rectum—*

Opener Dr C P V Menon, Madras

Seconder Dr E J Borges, Tata Memorial Hospital, Bombay

##### 2 *Carcinoma of the Cheek—*

Opener Dr B M Joly, Delhi

Seconder Dr K. M. Rai, Madras

##### 3 *Hard Lip and Cleft Palate—*

Opener Dr S C Sinha, Calcutta

Seconder Dr M G Kini, Madras

## 9th Meeting.

## 1. Bone Tumours—

Opener Dr D R Meher Homji, Bombay  
Seconder Dr M G Kini, Madras

## 2 Intracranial Tumour—

Opener Dr A V Baliga, Bombay  
Seconder Dr R N Cooper, Bombay

## 3 Burns—

Opener Dr M R Munawar Ali, Hyderabad  
Seconder Dr G M Phadke, Bombay.

## Prize Essay

The offer of a prize of Rs 150 for the best Essay on "Infections of the Foot" is renewed The following are the conditions —

1 The competition is open to all qualified medical practitioners registered in India, who have been in practice for not more than 10 years after qualification

2 The essay should be based on original work and should be written in English.

3. It should be type-written on one side of the paper only and should not contain the name or other indication of the identity of the competitor Four copies should be submitted

4 The name, address and qualifications, however, should be written on a separate sheet of paper and enclosed with the essay.

5 The subject is "Infections of the Foot" and the essay should reach the Secretary before the 1st October 1945

6. The copyright for the winning essay will remain with the Association of Surgeons of India and will be published in the Indian Journal of Surgery Other essays will be returned to the senders, if accompanied by stamped addressed envelopes

7. The Governing Body may, at its discretion, withhold the prize if the essays submitted do not come up to the standard

8 All communications regarding the above are to be addressed to the Secretary, Association of Surgeons of India, 'Binfield,' Kilpauk, Madras.

C. P. V. MENON,

Hony. Secretary

## AN APPEAL

The Editor,

Indian Journal of Surgery, Madras

Dear Editor,

Now that the quarterly meetings of the members of the Association of Surgeons of India, resident in Madras have become a regular feature for discussing some of the surgical problems by demonstrations and talks, may I suggest to you that this must be made a regular feature in all places where there are more than 6 members resident in a particular locality. The proceedings of the society may be reported to the Secretary for incorporation in the Journal of Surgery. I venture also to suggest that members should give an indication of their demonstrations a month in advance so as to evoke a good discussion on the problems by demonstrations of their own experience so as to make the discussion a lively affair and benefit not only the members of the association but also the junior members who wish to attend.

Yours faithfully,

M. G. Kini,

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